AMERICAN GAS ASSOCIATION MONTHLY

Vol. I No. 7

July 1919

EVERY MAN owes some of his time to the upbuilding of the profession to which he belongs.

— *Theodore Roosevelt.*

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C O N T E N T S

VOLUME I JULY, 1919 NUMBER 7

PAGE

Accident Prevention, Committee Report 387
Advertising Section Organized 369
Affiliated Associations—A. G. A. 376
Beal Medal for Technical Papers 381
Bibliography of Gas Literature 414
British Thermal Unit Chart 382
Canadian Gas Association Convention 388
Chemical Abstracts 411
Classified Directory, Manufacturers of Gas Equipment 393
Convention Program 377
Editorial—No Lack of Work Ahead 362
Gas Chemists' Handbook—Committee Report 385
Illuminating Appliances 404
Indiana B. t. u. Standard Report 363
Industrial Fuel—Brazing—Japanning 389
Institution of Gas Engineers—Major Strange Brings Message 362
Institution of Gas Engineers Honor A. G. A. President 375
New Members—List 413
Nominating Committees of A. G. A. Sections 380
Obituary—Wm. H. Soper 375
Technical Committee Reports 386
Window Displays Show Progress 391

AUTHORS

Cortelyou, G. B.—Address to Advertising Section 369
Earnshaw, E. H.—A New B. t. u. Chart 382
Forstall, A. E.—Education Department 404
Indiana Gas Standards Committee—Report 362

FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

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MONTHLY

ADDRESS ALL COMMUNICATIONS TO THE AMERICAN GAS ASSOCIATION, Inc.
130 E. 15th St., NEW YORK, N. Y.

Editor, ... Louis Stotz
Associate Editor, . T. M. Will

Vol. I JULY, 1919 No. 7

WITH THE EDITOR.

No Lack of Work Ahead

We will grant that it was the enthusiasts who attended the meeting on June 26. Advertising has a way of developing men who believe in it, in themselves and in their products. And we venture the statement that every man present had an idea which he believed the new Section should adopt at once and carry out to its logical prosperity. There were plans suggested for all-year peak loads, for gas romances rivaling Kipling and for selling gas securities. In the first place, every plan voiced had its own possibilities of development and in the second place, the very abundance of suggestions brought forward showed clearly the vitality of the idea behind this Advertising Section.

Unacquainted with the ways of advertising, one might have got an impression that the new Section had no respect for the boundaries of endeavor. To the initiated, however, the very promise of its success lies in the recognition of its rights within technical, commercial, accounting or managing "preserves." For advertising is not a commodity in itself—it is a result produced upon commodities that already exist.

An Advertising Section in the Association can not create gas, appliances and good service. It must recognize the existence of these products, however—handle them, pet them, display them, tell old facts about them and catch their romance to the point of creating "new facts" about them, until the faith of the manufacturer in their quality and value is ratified by the faith of the buyer in their honesty and worth.

Within the industry, because of the Advertising Section, salesmen will know more about the technical details of their merchandise and the executive details of the organization in which they work; likewise superintendents and managers will know more of the selling idea and the commercial department and the part which they play in the public opinion which affects the industry as a whole.

As between public and industry, an Advertising Section, once it finds its course, can introduce us to a public that, while accepting us as its servant, yet regards us as an intimate friend, holds us in due respect and cherishes for us a spirit of good will and appreciation that will eliminate from our rate, regulation and financing problems that biggest of perverse factors—lack of confidence.

Since our advertising enthusiasts themselves started it, let us say that we too see the big tasks ahead for this Section and that its evidence of ultimate success for us must be nothing less than an industry united on its high ideal of service and supported by a public whose confidence in it is entirely justified.

Fraternal Greetings from London

Major H. G. L. Strange, formerly Manager of the Honolulu Gas Company and well known to gas men on the Pacific Coast, has been discharged from service with the British Expeditionary Forces in France and is at present in the United States.

Major Strange was present at the meeting of the Institution of Gas Engineers, held in London in the latter part of May, and was asked to present to the American Gas Association, upon his arrival in the United States, the good wishes and fraternal greetings of the British Association.

The War which has brought so closely together the British and the American people, has further strengthened the already strong bond between the British and American gas men, and Major Strange's message to the American Gas Association is heartily welcomed and most warmly reciprocated.

It was at this meeting of the Institution of Gas Engineers that the courteous action was taken, electing the President of the A. G. A. to honorary membership.

AMERICAN GAS ASSOCIATION MONTHLY

Vol. I JULY, 1919 No. 7

Report to the Public Service Commission of Indiana

By the Indiana Gas Standards Committee

We are glad to be able, through the courtesy of Mr. H. O. Garman, Chief Engineer of the Public Service Commission of Indiana, to publish the text of the report made to the State Commission by the Indiana Gas Standards Committee, dated May 20, 1919.

This report is of great value to our industry, the more so that it has been rendered after a full investigation of essential facts through the united efforts of an impartial committee representing all parties concerned.

Our industry owes not a little to Mr. Garman for his breadth of view in having such a representative committee established as would command confidence, and for his untiring efforts as chairman in carrying through to completion the work planned, at a period of sickness and shortage of technical assistance, when investigations of this nature were not easy.

Nor are we disposed to withhold our praise for the thoroughness and energy with which the detailed work was accomplished under the direct care of Mr. Phillips, of the National Bureau of Standards.

Prof. H. C. Peffer is a man of wide engineering and chemical experience, who achieved a name in the earlier days of the aluminum industry, and has been continuously interested in gaseous combustion as an essential part of the metal and of the by-product plants with which he has been connected. It is because of his experience in these industries and his matured judgment that he has been selected to head the new department of Chemical Engineering at Purdue University.

The sound judgment and extensive knowledge of gas engineering of our own representative, Mr. J. B. Klumpp, need not be enlarged upon to the readers of the MONTHLY.

It is a strong report by a strong committee.

N. B.—The attached report, while signed, has not yet been officially approved by the Public Service Commission of Indiana.

Letter of Transmission

May 20, 1919.

The Indiana Gas Standards Committee, having reviewed the Rules for Gas Service proposed for adoption by the Public Service Commission, and having made a careful study to determine what in its opinion should be the heating-value standards for artificial gas sold in the State of Indiana, and having reached its conclusions, believes that its work is completed. It is pleased to inform the Public Service Commission that the members have agreed on all points, that the recommendations contained in this report represent the final individual opinion of each member, of what will prove fair to the people and the public utilities, and best for the State of Indiana as a whole.

In its work the Committee has come in contact with many public officials, officials of public utilities, and private individuals who have not only without exception, shown a fine courtesy, but have also furnished invaluable data and information. For their aid in this investigation the Committee is most grateful. Their opinions also have been valuable and have received due consideration.

Believing that it has investigated and carefully considered all pertinent facts, data and information, and having reached its conclusions, the Committee begs to present to the Public Service Commission this final report.

H. O. GARMAN,
Chief Engineer, Public Service Commission, Chairman.

H. C. PEFFER,
Representing Municipal League of Indiana.

CHAS. O. BOND,
Representing Indiana Gas Association.

ALFRED I. PHILLIPS,
Representing National Bureau of Standards.

Report Recommending B. t. u. Standard

DURING the first part of 1918, and in fact, extending well into the Summer of that year, the Public Service Commission received frequent complaints from the citizens of a number of different localities in the State, regarding the quality of the gas service rendered by their local companies. The exact cause of the trouble was not always evident from the complaints; in a number of cases it appeared that the heating value of the gas was low; but at all events the general situation was serious enough to demand investigation.

Conferences with gas company officials brought to light some of the war-time difficulties under which they were laboring. Because of the zoning system adopted by the U. S. Fuel Administration, coal gas operators were forced to use a large proportion of Indiana and Illinois coals. Aside from the greater difficulty in handling, particularly in plants containing horizontal retorts, these coals give low yields of gas of low heating value. Furthermore, the coke produced is usually of an inferior quality, and when used in the water gas machines, reduces the capacity and efficiency of operation. While fuel of any kind was difficult to obtain, even with the assistance of priority orders issued by the Government, gas oil, which is required in water gas manufacture to produce high heating value gas, was even more scarce, it being urgently needed for military purposes.

In fact, the shortage of both coal and oil became so acute that the United States Fuel Administration seriously considered issuing an order requiring a reduction in the heating value of manufactured gas throughout the country to 528 B. t. u. per cubic foot, in the hope that conservation of coal and oil might thereby be effected. Under such circumstances it is not surprising that the quality of gas service was seriously impaired in many localities, not only in this State, but over the entire country.

The Public Service Commission of Indiana, realizing these difficulties, but at the same time anxious to require the maintenance of the best possible service under the circumstances, decided to call a public meeting for a frank discussion of the whole situation. Accordingly, such a meeting was held at the State House in Indianapolis on October 8, 1918, and was attended by city authorities and gas company officials from all parts of the State, and by members of the National Bureau of Standards and of the United States Fuel Administration. A proposed new set of rules for gas service was presented by the Engineering Department of the Public Service Commission, and was offered to the meeting for consideration before its final adoption. A lengthy discussion followed, particularly as to what heating value standard should be required.

Under the then existing war-time conditions it appeared entirely impossible for most companies to maintain the State standard of 600 B. t. u. per cubic foot, but there was considerable diversity of opinion as to what heating value could and should be expected. The information on this subject seemed rather meagre and it was finally decided that a committee be appointed to make such investigation, conduct such tests, and collect such data as it might require to

draw its conclusions as to a fair heating-value standard and to report its findings to the Public Service Commission.

It was agreed that the Indiana Gas Standards Committee should consist of four senior members, one to be appointed by each of the following interests: The Municipal League of Indiana, the Indiana Gas Association, the Public Service Commission of Indiana, and the National Bureau of Standards. Accordingly, the following members were appointed by their respective interests:

The Municipal League—Prof. H. C. Peffer, Head of the School of Chemical Engineering, Purdue University, Lafayette, Indiana.

Indiana Gas Association—Henry I. Lea, Consulting Gas Engineer, Chicago, Ill.

Public Service Commission—H. O. Garman, Chief Engineer of the Commission.

National Bureau of Standards—A. I. Phillips, Associate Gas Engineer of the Bureau.

Later Mr. Lea found it necessary to present his resignation as he was to be absent from the Middle West for some time, and J. B. Klumpp, inspecting engineer of the United Gas Improvement Co., of Philadelphia, Pa., took his place as the representative of the Indiana Gas Association.

Mr. Garman was elected Chairman of the Committee.

At its first meeting on October 28, the Committee carefully considered the set of rules for gas service proposed by the Engineering Department of the Public Service Commission (Appendix I). Some corrections and alterations were suggested. Rules 11 and 16 relating to heating value standards and heating value tests were the subjects, the investigation of which constituted the work of this Committee.

Attention was then turned to the question of the heating-value standard. It was agreed that water gas plants could maintain a standard of 600 B. t. u. with a fair degree of efficiency, provided they had sufficient oil. Although at this time oil was difficult to obtain and its conservation was of the utmost importance, yet the Committee believed that such a standard as could be maintained by plants producing coal gas would prove practicable for water gas also, and further discussion of this subject was postponed.

There was, however, a lack of information as to what performance might reasonably be expected of the coal-gas plants in the State, particularly in using the large percentages of local coal which had been generally allotted to them. A rather exhaustive investigation of all facts which might lead to a decision as to what heating value of gas it would be practicable to maintain in these plants, was therefore decided on. In Appendix II are stated some of the points which the Committee at that time considered pertinent.

The field work of the investigation appeared naturally to resolve itself into three parts: (1) The collection of data from the files of the Public Service Commission and from the records of the companies themselves. (2) Exhaustive plant tests at a few of the plants in the State. (3) A number of short inspections of coal gas and coke oven plants by members of the Committee to gain general information as to works conditions, and by checking the various calorimeters to establish the reliability of the data and records obtained from the companies during the earlier stages of the work.

Investigation on Peace-Time Basis.

About this time an important event intervened. On November 11 the Armis-

tice was signed and conditions throughout the country assumed a new aspect. Oil shortage became less acute, although the price remained high. The coal-zoning system was abolished, allowing companies the opportunity to obtain supplies of high grade gas coals which, because of the cessation of many war industries, became more plentiful. It was, however, deemed desirable to continue the work of the Committee in spite of the altered situation, and the investigation became, in fact, one of peace-time rather than war-time conditions.

The "Preliminary Investigation," namely, the collection of existing data, was conducted by H. B. Heign of the Commission Engineering Staff and M. J. Frankel of the Bureau of Standards, during the latter part of November and the early part of December, 1918. Figures as to population, gas sales, miles of mains, number of meters, etc., were obtained from the files of the Commission. A considerable proportion of the coal-gas and the mixed-gas plants in the State were visited and valuable data as to gas heating values, gas yields, and kinds of coal used for a number of years past were obtained. General condition of equipment and other pertinent points were noted, as well as the facilities for possible future tests by the Committee. The data obtained were assembled and tabulated and a short discussion prepared by the Engineering Department of the Public Service Commission; the complete report of this preliminary investigation thus prepared was submitted to the Committee for consideration at its next meeting on January 3, 1919. In order that the Public Service Commission may be thoroughly informed on all points relating to the case, a copy of the report, as presented to the Committee, accompanies this document.

The data and information which the report contains are of the utmost value and have been well arranged, but the discussion appearing on the first few pages was, necessarily, rather hurriedly prepared and, the Committee believes, is, in places, apt to prove misleading. For example, while it is true that over 40 per cent. of the plants in the State manufacture coal gas alone, yet the total quantity of gas manufactured by these plants equals only about 8 per cent. of the entire amount produced. On the other hand, while the number of coke oven plants amounts to only about 9 per cent. of the total, yet they manufacture over half the gas used in the State. Viewed in this light, the coke oven plants assume a far greater importance, especially when it is remembered that the number of consumers served is nearly proportional to the quantity of gas manufactured. Again, the Committee cannot agree that the use of light seals or high heats is undesirable in coal gas plants, nor does it believe that coke oven plants can, in all cases, operate economically under a standard which may prove practicable for coal gas plants.

Extent of Tests Conducted

The discussion of the testing facilities at the various plants, however, proved very valuable and it was due to the information and recommendations in the latter part of the report that the Committee chose the plants at New Albany, Crawfordsville, Huntington, and Fort Wayne for exhaustive tests. Later it was found that at the Fort Wayne plant, which produces both coal and water gas, it would be impossible to isolate a holder for the use of coal gas alone; and, therefore, believing that the information which they desired could not easily be obtained, the Committee decided to abandon the test at Fort Wayne and ship some of the coal regularly used at that plant to Huntington for use during a part of the test there.

Tests extending over the period from February 2 to April 10 were run at New Albany, Crawfordsville and Huntington. The heating value of the gas at the inlet and outlet of the holders was observed at frequent intervals, gas analysis and other tests were made, the coal used was weighed and the yield of gas computed, and a complete and detailed record of retort house operation was kept. H. O. Garman, chief engineer of the Commission, as Chairman of the Committee, was in charge of the tests; but, due to the fact that he was unable to be present continuously, A. I. Phillips, associate gas engineer of the Bureau of Standards, undertook the active supervision of the work. C. O. Bond, manager of the physical laboratory of the United Gas Improvement Co., was present continuously as the representative of the Indiana Gas Association, acting for J. B. Klumpp. Observations were made by a force consisting of the following engineers: F. J. Hiss, plant engineer, Northern Indiana Gas & Electric Co., Lafayette, Ind.; J. Weaver Smith, appliance engineer, Citizens Gas Co., Indianapolis, Ind.; F. W. Boetel, J. T. Hallett, D. W. Hufferd, and M. F. Scott, engineers on the staff of the Public Service Commission of Indiana, and M. L. Abbott and M. J. Frankel, assistant gas engineers of the National Bureau of Standards. A further description of the tests is contained in Appendix IV.

At this point it is interesting to note that the results obtained at Crawfordsville, while using mixtures of Indiana and Eastern Kentucky coals, probably give some indication of what the Committee might have found had war conditions continued.

During the progress of these tests, there were two meetings of the Committee. At the first, held at the Hotel Fowler at Lafayette on March 4, the decision as to the abandonment of the Fort Wayne test was reached and an extension of the Crawfordsville test was also declared desirable; while at the second, held at the Hotel Claypool, Indianapolis, on April 3, the additional work believed necessary to bring the investigation to a close was discussed.

On April 21, after the close of the Huntington test, a meeting of the Committee was held at the State House to discuss the work already completed and to lay plans for the future. It was decided that a report of the tests to date be prepared and that a number of short investigations, such as were contemplated at the first meeting of the Committee, be made. A summary of the decisions reached at this meeting is contained in Appendix III. The report of the tests at New Albany, Crawfordsville, and Huntington appears as Appendix IV.

In the series of short investigations, only six plants were to be considered, but after several had been visited, a realization of the value of the data being obtained led to a continuation of the plan. Thus, in all, plants in 14 different cities were visited, namely: Auburn Junction, Warsaw, Goshen, Elkhart, Rochester, Muncie, Greencastle, Terre Haute, Vincennes, Evansville, Washington, Seymour, Columbus, and Franklin. Calorimeters were checked to determine the reliability of previous heating value records, the plants were visited and equipment and operating practice carefully gone into, to determine not only the heating value of the gas being produced, but the heating value which the Committee believed the plant *should* produce. This part of the investigation was conducted by Messrs. Abbott, Bond, Hufferd and Phillips. A report of the conditions observed at each plant visited is contained in Appendix V.

(*Continued on page 400*)

Advertising Section Organized

SEVENTY-FIVE gas company, manufacturer and trade journal men all interested in the advertising and publicity aspect of the industry, were present at the organization meeting of the Advertising Section of the American Gas Association, which was held on June 26, in the Auditorium at 128 E. 15th Street, New York.

The President of the Association, Mr. George B. Cortelyou, opened the meeting and in a short address called attention to the business to be transacted and the general purpose of the Section to be organized.

President Cortelyou's Address.

I shall speak but briefly, but I feel I should say a word on an occasion as interesting as this, because any occasion, particularly in a great national association, where a new movement is started, a movement having as important a matter to deal with as the question of national advertising and national publicity, is for the membership of the Association certainly a most interesting one.

In the Prospectus of the Joint Committee outlining a plan for the amalgamation of the two old Associations, which resulted in the present American Gas Association, I find one paragraph that seems to me to apply particularly to the meeting this morning. That paragraph reads, "The need for one strong, central gas organization, with adequate financial backing, widespread membership, and well-co-ordinated undertakings, has never been as self-evident as at the present time." And I lay emphasis on the expression "well-co-ordinated undertakings." Certainly there would be no difference of opinion as to the necessity for regarding a well-formulated, and thoroughly well carried out, scheme of national advertising and publicity, as among those features of co-ordination necessary to the life and progress of the American Gas Association.

At the conclusion of his very interesting address at the March Conference, Mr. Saul spoke as follows:

"I think I can foresee very clearly the new gas industry which this Association is striving to develop upon its pre-war foundations. I know that already—within four brief months after the close of a colossally expensive world war—the Association's activities and plans have encouraged and revitalized many company units and individuals throughout the country. From my central viewpoint at Chicago, I can daily see constantly growing evidences of new life and new hope, springing up everywhere, in our industry. I speak conservatively when I assert that the gas industry is coming up out of the cyclone cellar, and it is coming up seeking new pathways of progress and creating new ideals to light its forward way."

I am sure that in this paragraph he spoke for the industry and for the great trade journals that represent it so intelligently in the newspaper world.

Now, in the last number of the Association MONTHLY, we concluded some editorial comments with the popular expression "LET'S GO."

In the July number of the *Roycroft*, the magazine that succeeded the *Philistine*, that interesting publication of Elbert Hubbard, is a short article which I should like to read to you. It refers to

the campaign being conducted under the guidance of Mr. Roger W. Babson, the well known statistician and economist; and then proceeds as follows:

"There seems to be a lot of hair-trigger Americans around these days. And some of the strongest business men in the country are behaving as if their brains had deserted them. Fuel is being thrown upon the Bolshevist bonfires by ill-considered speech and unwise act.

"But surely it is not a violent assumption that the United States will continue on the map! And a truth we must absorb is that to keep it there we must roll up our sleeves and get busy.

"Our difficulties are due chiefly to the necessary readjustment of our war-time activities into peacetime industries. During the war we were asked to refrain from buying anything we did not actually need. Every cent we had, every ounce of energy and strength was needed for war purposes. There was nothing to spare for things we could get along without. And how we fell in with the arrangement is history.

"Now that the war is ended, we find stocks of peacetime goods depleted. There is a lack of almost everything that was not produced in quantity for the war. And with the depletion of our supplies there has come nervousness in some quarters. Industry is marking time. The manufacturer is purchasing raw materials from hand to mouth. The merchant is running his business on skeleton stocked shelves. The public is not buying anything—(a somewhat overdrawn statement as to certain lines of business)—or as little as possible. (I have an idea this was written sometime ago.) Everyone is waiting for everyone else. This hand to mouth policy is expensive, costly and disquieting. Volume cuts costs to a minimum. There's nothing the matter with the U. S.! Who said there was?

"The manufacturer cannot make nor the merchant sell, unless the public buy. The public are the regulators and controllers of all production and distribution.

"Hence 'Buy now, but buy wisely!' has been adopted as the slogan of the Department of Labor sponsoring this campaign under Babson's guidance.

"Progressive merchants must advertise to energize business. The United States is richer than ever; it has greater prestige than ever; its markets, both home and abroad, are bigger. This timidity is childish.

"Jeremiahs must come out of it! This is no time for lamentations. We must get back that confidence, that enthusiasm, that pep, that true American spirit that laughed at impossibilities the war forced upon us and performed miracles.

"Now is the psychological time for this prosperity drive. Let us take up the slack. Let us buy, wisely, intelligently, judiciously, but BUY.

"A few additional purchases added to the necessity purchases will increase the grand total of sales to such an extent that the merchant will be obliged to carry a bigger stock. The wholesaler, manufacturer and producer of raw materials will be obliged to increase production. That means business booming, everybody at work—the demobilized soldier, sailor and munition worker. It means every worker at his bench or desk. It means a normal prosperity of peace with industries running at full time and Bolshevism buffaloed."

Some portions of that I am sure appeal to all of us.

To-day we have met to take another step toward realizing the conception of a thoroughly established system of adver-

tising and publicity. Just the lines along which that movement shall proceed rests with you gentlemen and with the membership of the American Gas Association. The meeting has been called to take the necessary steps toward organizing the advertising and publicity idea—I will not say Section yet, because that is not an established fact—but at any rate we are here to discuss the subject from every angle and to take the necessary preliminary steps toward progress. And I want to say to you, as I have had occasion to say to the workers in the existing Sections of the Association, that we want you to feel free at all times to call upon the executive officers of the Association if you think there is any way we can, by counsel or suggestion, aid you.

Now, I will turn the meeting over to Mr. Wrightington and wish you good progress toward realizing the purpose of the meeting.

Nominating Committee Appointed

Mr. E. N. Wrightington, of Boston, called upon to assume the chair, made a few pungent remarks which led to the statement that we must acquaint the public with the fact that it wants gas, not because it's cheap, but because it's good. An Advertising Section, started from the ranks and conducted by the ranks can be the best possible instrument for accomplishing definite results; it can be one of the very best things the gas industry of the country has ever had.

The first business before the meeting concerned the appointment of a nominating committee which, as finally approved, consisted of

Donald McDonald, New York, N. Y.
Milt Saul, Chicago, Ill.
W. J. Clark, Mt. Vernon, N. Y.
H. B. McLean, New York, N. Y.
L. S. Bigelow, Buffalo, N. Y.

There followed various expressions of opinion as to the type of man suited for chairman of so important a Section, and his qualifications and position in the gas industry, the keynote of which was a plea for a man of broad vision, unhampered by tradition, transcending the purely commercial idea, and interested in the gas business in all its parts.

After a short recess, the Nominating Committee returned to the hall and through its chairman, Mr. Donald McDonald, reported the following as nominees for the offices of the Section

Chairman—George Williams,
H. L. Doherty & Co., New York.
Vice-Chairman—H. K. Dodson,
Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

The slate proposed by the Nominating Committee was unanimously accepted.

Procedure in Organization

The Sections of the Association are directed by managing committees, appointed, according to custom, by the Chairman and Vice-Chairman of each Section. To a committee of nine members, thus selected, there are added the representatives of affiliated societies, as approved by the Executive Board of the A. G. A.

The Managing Committee of the Advertising Section will be announced later, and upon its formation, will at once proceed to outline the further organization of the Section and its committees, and the details of the work which it believes should be undertaken. This outline will be presented to the Executive Board and in its final form, will constitute the plan of action for the Section.

With Mr. Dodson in the chair, the meeting was thrown open for a general expression and discussion of ideas concerning the Section's purpose and lines of development.

On request, Mr. F. D. Pembleton favored the meeting with an outline of the method employed by the N. E. L. A., in handling its publicity work.

The Commercial Section of the N. E. L. A., is headed by a Chairman, Vice-Chairman, Secretary and Executive Committee—members of which are appointed as Chairman of Sub-Committees. In the Commercial Section there is a Publication Committee of fifteen men, selected among the advertising men who represent the central stations, the manufacturers and the trade journals.

The first function of this Committee was the publication of material of an educational nature. This has, however, gradually changed, until at present the committee produces material entirely of an advertising nature to sell products. The plan is to produce literature of such general interest and application that it can be used locally, and at a cost lower than the local company could produce it.

Mr. Pembleton noted that, whereas the N. E. L. A. Committee was practically a service bureau, it appeared that the A. G. A. contemplated the promotion of national publicity. "If I may present an idea, it is that there never has been a time in the history of the electric and gas companies when helpful publicity of a national character is so much needed to sell the good will of these companies to the public and especially to sell the service so as to make people realize the value of the service we render."

There is a movement on foot in the N. E. L. A. to undertake a national publicity campaign, which will be handled by a special committee of the Commercial Section, and Mr. Pembleton suggested the advantage of a comparison of methods as a benefit to both Associations.

Somewhat later, Mr. W. B. Way, Secretary of the Natural Gas Association of America, addressed the assembly. The N. G. A. A. has outlined a program for the education of consumers, governed by financial limitations.

First: Each company member will be asked to name some one from its organization as a rate correspondent to furnish information called for by a questionnaire to be sent to each company member by the Secretary of the Association.

Second: Each company member will be requested to name a publicity correspondent who will send to the Secretary's office, copies or clippings of both paid advertising and reading matter on natural gas. This compilation of rates and advertising matter in the Secretary's office will be so filed as to be available to company members who may be interested in its use for local publicity.

Third: Steps will be taken to provide a list of available lecturers or speakers on the subject of natural gas, whose services may be obtained by companies at a fixed compensation. There are at the present time lecturers enough to form a nucleus for this kind of work.

Fourth: Methods for publicity, through the sending of bills to customers, will be worked out and suggestions made for using this easily available medium which is often overlooked and neglected.

The N. G. A. A. Committee requests suggestions from both its company and individual members with regard to any phase of publicity work, and it is suggested that the publicity correspondents named be men who will take a strong interest in co-operating with the organization in perfecting and making valuable this important part of the Association's work.

The informal discussion of the meeting divided itself into two main considerations—suggestions for organizing the Section and carrying out its purpose,

and expressions of opinion as to work which it might be expected to undertake.

Mr. Milt Saul believed that the matter of first importance must be a plan to secure membership for the Section, followed by some arrangement by which every gas company in the country, particularly the company members of the A. G. A., will appoint a representative to get into immediate touch with the Section.

Mr. M. C. Robbins, of New York City, laid stress upon the problem of financing the work of the Section, which must necessarily be taken up at an early date. Real support, he declared, might be expected (1) from manufacturer company members in the form of money —(2) from gas company members in the form of newspaper space contributed on a definite schedule as, for instance, one agate line for each thousand cubic feet of gas sold, and (3) from the individuals of the industry, in the form of ideas and working assistance. With such support, and a director of publicity selected for his ability to carry through a sustained, forceful campaign, the Section could create good will and increase the use of gas.

Mr. Bigelow made the point that the Section would in no way seek to act as a substitute for the local advertising men employed by the gas companies. The work of the Section would be to supplement their efforts and to secure their co-operation in giving national publicity to material that has heretofore been limited to the local field. Mr. Bigelow quoted the Cypress Association as an analogy for the work which the Advertising Section can accomplish.

Activities Suggested

The records of the suggestions made as to the nature of the work which the Section may well undertake, must be of interest to both individual members of the Section and to those who eventually constitute its Managing Committee. As expressed by Mr. Saul and Mr. Robbins, and agreed to by practically every other speaker—the Advertising and Publicity Section must get beyond the sale of particular appliances, and work for sustained publicity in a national field, with a view to marketing gas securities and adjusting rates as well as selling gas.

Mr. Saul suggested as an example of the work wanted, "The story of gas and gas service; what it means to men engaged in it; what it means to the public that receives it; what the gas companies require in the way of co-operation from their communities, for existence and for expansion."

Mr. Robbins' suggestion concerned the handling of publicity through the reading columns of newspapers and magazines.

Mr. W. G. Murfit, of Newtown, Pa., in speaking of space contributions to be made by local companies, enlarged upon this very point. The small newspaper is usually found ready to open its columns to the news story. Articles relating the feats of gas, its important part in the war, the astonishing figures concerning its output, facts about processes in its manufacture and about its by-products, can all find a place in the country paper, if issued in readable form. Mr. Murfit also suggested the possibility of lectures or lecturers sent out by the Section.

Mr. C. O. Bond, of Philadelphia, pointed out the need for getting into immediate contact with our sources of interesting information—the laboratory for example—records of which show many significant facts waiting to be woven into stories of real interest. The gas industry has a mine of romance which, in the hands of a good writer, can be made as popular as Kipling's stories of the barracks. Furthermore, the gas

field can probably also supply the genius to write these stories.

Mr. E. S. Dickey's remarks summed up definitely much that had been suggested or intimated by previous speakers. The advertising of gas must eventually reach and stir the people, through whatever channels it may be directed, and definite, concrete presentation of facts in story form is often more effective than straight advertising copy. The purpose of advertising or story, however, must be to convince each possible consumer of the fact that the gas companies make a product which his own demands make indispensable to him. Incidentally, Mr. Dickey touched upon the ultimate likelihood of federal regulation of utilities.

Somewhat more definite was the suggestion of Mr. Wrightington that the Section act as a clearing house of advertising done by local companies throughout the country. To collect "copy," to have it criticised by a competent advertising man, and to have selections from the best of it passed on to Association members through the A. G. A. MONTHLY or special circulars would tend to raise the standard of such copy and assist the small companies.

Mr. R. S. Doull's (New York) plea was for the advertising of gas service and he suggested that the most forceful method of impressing its value upon the public might be found in recommendations made by architects and contractors. This implies a plan of advertising directed toward the architect, which, properly managed, would lead eventually to convincing both architect and public that in every case they should "Go to the gas company for service."

Mr. William Gould, of Boston, would like to see some concerted effort to build up a "tradition" for 12 months per year burning of gas appliances. There is work for an advertising section where output curves of even big companies show as much as 60 per cent. differences between different seasons.

Such a discrepancy, said Mr. B. J. Mullaney, Chicago, might well be corrected by the introduction of a larger industrial load. The Advertising Section may find a field for its activities in securing and publishing data on the industrial use of gas. Industrial men in plants and factories of various kinds often need education in figuring costs on fuels and these men deserve attention from the new section.

It is a known fact that, from various motives, office holders or newspapers do, every now and then, conduct unjust campaigns against public utilities. Mr. McDonald cited one such case, recently brought against a gas company and remarked that stockholders of the gas company might easily have exerted a legitimate influence on the newspaper which reported the case in a perverted light, if their attention had been called to their own power. The Advertising Section may find it possible to come to the help of companies so distressed, to deal adequately with such harmful publicity and to get the honest support of the daily press.

In bringing the meeting to a close, Mr. Dodson took occasion to call attention to the work already carried on by the Special Sales Campaign Committee of the Commercial Section, with its plans for 12 special weeks of sales effort throughout the year and the possibility of a cooperation between this Committee and the Advertising Section that would be of benefit, not only to these two, but to the industry as a whole.

HOTEL PENNSYLVANIA
OCTOBER 13-18

English Society Honors President of American Gas Association

THE following letters record the conferring of an honor upon the American Gas Association, through its President, Mr. George B. Cortelyou, by The Institution of Gas Engineers; and the acceptance by Mr. Cortelyou.

The Institution of Gas Engineers has been in existence, although its name has been changed once or twice, for seven or eight decades, and it stands to-day as one of the most important organizations in the gas field, in England, if not in the world. The Institution has maintained itself conservatively as a society of especially trained technical men, while showing its interest in the commercial aspects of the field through its connections with and support of the B. C. G. A., and this courteous act which makes the President of the A. G. A. an honorary member of The Institution of Gas Engineers, is an expression of confidence in the high and serious purposes of our American Society which cannot but reflect upon us some of the glory of our English friends.

6th June, 1919.

THE SECRETARY,
THE AMERICAN GAS ASSOCIATION,
130 East 15th Street,
New York, U. S. A.

DEAR SIR:

I beg to inform you that at the Annual General Meeting of this Institution last week it was unanimously resolved that the President of the American Gas Association for the time being, during the ensuing twelve months should be elected as Honorary Member of the Institution of Gas Engineers.

Will you be so good as to inform Mr. Cortelyou of his election accordingly, and much oblige

Yours faithfully,
(Signed) W. T. DUNN,
Secretary.

June 26, 1919.

MY DEAR SIR:

The Secretary-Manager of the American Gas Association has handed me your letter of June 6, in which you state that the President of the Association was elected, at the recent Annual General Meeting, an Honorary Member of the Institution of Gas Engineers, for the ensuing twelve months.

I take pleasure in telling you that the Association and its President greatly appreciate the honor conveyed by this action, and in extending to the Institution cordial greetings and best wishes.

Very truly yours,
(Signed) GEO. B. CORTELYOU.

W. T. DUNN, F. C. I. S.,
SECRETARY, THE INSTITUTION OF GAS ENGINEERS,
39 Victoria St., Westminster,
London, England.

OBITUARY

William Henry Soper, General Superintendent of Gas Manufacture of the Nova Scotia Tramways and Power Co., Ltd., of Halifax, N. S., died on May 18 at his home. Mr. Soper was born in Newton Abbott, England, in 1847 and went to Halifax in 1869. His connection with the Nova Scotia Company began in 1876 and for seventeen years he had held the position of superintendent.

Mr. Soper has left two sons, William S., Superintendent of Lighting and John H., of the Gas Department of the Nova Scotia Company.

Mr. Soper was prominent in the Canadian Gas Association and a member of the American Gas Institute. He was a Mason of high degree, a charter member of the Mystic Shrine and a Provincial Grand Prior in the Knights Templars.

Associations Affiliated with A. G. A.

Canadian Gas Association

Pres.—C. C. Folger, Kingston, Ont.
V.-Pres.—V. S. McIntyre,
C. S. Bagg.
Sec.-Tr.—G. W. Allen, 19 Toronto St., Toronto, Ont.
Conv., 1919, Aug. 21-22—Niagara Falls, Ont.

Illinois Gas Association

Pres.—H. S. Whipple, Rockford, Ill.
V.-Pres.—W. M. Willett.
Sec.-Tr.—H. H. Clark, 72 W. Adams St., Chicago, Ill.
Conv., 1920, March 17-18.

Indiana Gas Association

Pres.—R. A. Ziegler, Anderson, Ind.
V.-Pres.—J. D. Forrest.
Sec.-Tr.—R. E. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., 1920, April 28.

Iowa District Gas Association

Pres.—Geo. D. Roper, Rockford, Ill.
V.-Pres.—W. H. Taylor,
C. N. Chubb.
Sec. Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1920.

New England Association of Gas Engineers

Pres.—A. M. Barnes, Cambridge, Mass.
V.-Pres.—W. F. Norton,
Burton Smart.
Sec.-Tr.—N. W. Gifford, 38 Central Sq., East Boston, Mass.
Conv., 1920, Feb. 18-19—Boston, Mass.

New Jersey State Gas Association

Pres.—C. W. Hoy, Glassboro, N. J.
V.-Pres.—R. H. Garrison.
Sec.-Tr.—Wm. P. Adams, Millville, N. J.
Conv., 1920.

Pennsylvania Gas Association

Pres.—G. F. Speaker, Lebanon, Pa.
V.-Pres.—O. H. Heckert,
J. L. Mather.
Sec.-Tr.—L. R. Dutton, Jenkintown, Pa.
Conv., 1920, April 14-15—Philadelphia, Pa.

Southern Gas Association

Pres.—Noble Clay, Durham, N. C.
V.-Pres.—E. S. Dickey,
J. H. Haggerty.
Sec.-Tr.—M. A. Bowlin, Macon, Ga.
Conv., 1920, Norfolk, Va.

Wisconsin Gas Association

Pres.—Bruno Rahn, Milwaukee, Wis.
Sec.-Tr.—Henry Harmon, 182 Wisconsin St., Milwaukee, Wis.
Conv., 1920, Milwaukee, Wis.

OTHER ASSOCIATIONS

Empire State Gas & Electric Association

Pres.—E. H. Palmer, Geneva, N. Y.
V.-Pres.—H. W. Peck,
E. H. Rosenquest.
Sec.-Tr.—C. H. B. Chapin, 29 W. 39th St., New York, N. Y.
Conv., 1919, Oct. 13-18—New York, N. Y.

Michigan State Gas Association

Pres.—Samuel Ball, Bay City, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids, Mich.
Conv., 1919, September.

Natural Gas Association of America

Pres.—Bert. C. Oliphant, Buffalo, N. Y.
V.-Pres.—Harry J. Hoover,
Ogden K. Shannon,
H. A. Quay.
Sec.-Tr.—Wm. B. Way, 904-5 Oliver Bldg., Pittsburgh, Pa.
Conv., 1920, Atlantic City, N. J.

Pacific Coast Gas Association

Pres.—John D. Kuster, San Jose, Cal.
Sec.-Tr.—Henry Bostwick, 445 Sutter St., San Francisco, Cal.
Conv., 1919, September.

Society of Gas Lighting

Pres.—Alex. H. Strecker, Newark, N. J.
V.-Pres.—W. Cullen Morris.
Sec.—Geo. G. Ramsdell, 130 E. 15th St., New York, N. Y.
Treas.—Wm. J. Welsh
Conv., 1919, December 11.

Southwestern Electrical and Gas Association

Pres.—Burr Martin, Dallas, Texas.
V.-Pres.—A. Hardgrave,
C. E. Corder,
A. H. Warren.
Sec.—H. S. Cooper, Slaughter Bldg., Dallas, Texas.
Treas.—J. B. Walker.
Conv., 1920.

Texas Gas Association

Pres.—W. H. Sedberry, Marshall, Texas.
Sec.—C. H. Seidenglanz, Dallas, Texas.
Conv., 1919, Oct., 14-15, Houston, Texas.

OCTOBER 13--18

FIRST ANNUAL CONVENTION

Convention Program Omits No Live Questions

OCTOBER 13-14-15-16-17-18

THE program of the first annual Convention and Exhibition of the American Gas Association to be held at Hotel Pennsylvania from October 13-18, is planned to bring out for discussion those essential problems of the new order which are occupying so much of the time and attention of gas men.

As tentatively arranged, the morning hours of October 14, 15 and 16 will be devoted to general sessions, at which papers will be read by some of the biggest men of the industry on subjects ranging from the financing of utilities and the marketing of securities, to the regulation of public service corporations.

The afternoons of these three days will be assigned to special sessions during which each section will present to its own audience a program of papers selected by its leaders to cover the phases of activity of greatest interest to it.

Special committees have been at work on the preparation of these section programs and the reports of standing committees and sub-committees will, in themselves, prove of great value.

The following is a program as conditionally arranged for general and special sessions, subject to change in exact wording of titles, depending upon the author finally appointed.

Diversity of Interests Represented

Noticeable in a first glance at this program, is the wide field of subjects which it covers. The complexity of the industry in which we work was made more apparent to us as we found ourselves called upon to supply many of the needs of a nation at war. We know that our strength will lie in giving the proper value to and exacting the proper returns from each unit that makes up the gas industry as a whole. As a Prosperity Convention, this first convention of the A. G. A. has kept all interests in mind and is working for the representation, on both platform and floor, of all branches of the industry.

Gas Company Representatives

Every gas company should be represented by delegate on the floor of the Convention, but in order to obtain every possible advantage from the valuable program and discussions to be offered, every gas company should also be present in the persons of a number of its employees—men interested in special phases of work and instructed to carry away with them definite information and suggestions on the specialized subjects considered.

Gas companies are urged to call their organizations together now, to hold a miniature convention in the office or shop, for the purpose of obtaining definite ideas as to the particular problems that are confronting the company or its men. Such a plan will both enliven the interest of the men and make it easier for the company to select exactly the best representatives for attendance at the Convention.

It should be made clear to each representative of the company what the purpose of his attendance is, and what he will be expected to report back to his employers. The gas company that sends

(Continued on page 379)

PROGRAM FOR CONVENTION OF A. G. A.

GENERAL SESSIONS.

Papers:

What Are the Needs of the Gas Industry
Henry L. Doherty, New York, N. Y.

Developing the Unsold Market for Gas..Chas. A. Munroe, Chicago, Ill.

Creating a Market for Utility Securities
F. H. Sisson, Vice-Pres. Guaranty Trust Co., New York

Influence of Publicity in Establishing Relations Between Utilities and Public
N. C. Kingsbury, Vice-Pres. Am. Telegraph & Telephone Co., N. Y.

The Value of the Chemist to the Gas Industry as a Whole, Through Research Work, and the Development of By-Products
Wm. H. Gartley, Philadelphia, Pa.

Reports of Committees:

Amendments to Constitution.....W. J. Clark
Accident Prevention.....J. B. Douglas
Educational Committee.....Walton Clark

SPECIAL SESSIONS.

Accounting Section.

Papers:

Uniform Classification of Gas Accounts.
Bonus Systems.
Bookkeeping Without Books.....H. B. Lohmeyer, Baltimore, Md.
Office Labor Saving Devices.....John L. Conover, Newark, N. J.
Merchandizing Accounting.....W. A. Sauer, Chicago, Ill.

Commercial Section.

Papers:

Getting and Keeping the Hotel Business, R. V. Howes, New York, N. Y.
Gas Company Merchandizing.....M. C. Robbins, New York, N. Y.
Radiant Heat.....Dr. Clayton H. Sharp, New York, N. Y.

Reports of Committees:

Sales Development Committee.....J. P. Hanlan
Sub-Committees:
Manufacturers .....H. W. Hunter
Basis for arriving at new business costs and proper method to determine sales prices of appliances and jobbing work .....A. P. Post
Compensation, selecting and training of sales representatives
H. S. Christman
Ways and means for filling in the valley periods of merchandize and gas sales.....Wm. Gould
Sales Campaigns.....H. K. Dodson
Appliance Maintenance.....J. C. D. Clark

Industrial Fuel Committee.....Thomson King
Sub-Committees:
Improvement of Atmospheric Burners.....Jerome Brandes
Proportional Mixing.....Thomson King
Furnace Performance Standards.....I Lundgaard
Unit Cost Data.....H. Vittinghoff

Heating Committee.....Geo. S. Barrows

Committee on Relations with Architects, Builders and Contractors
R. S. Doull

Illumination Committee.....C. O. Bond

Technical Section.

Papers:

Recent Improvements and Developments in Regulating Pressures from Transmission or Pumping Mains into Distribution Mains.....G. T. Macbeth
Use of Carborundum Brick in Generator.....Rollin Buckminster
Value of Chemist to the Gas Plant.....E. J. Murphy
H. Vittinghoff
A Sampling Devise for the Investigation of Water Gas Operation
R. A. Carter, Jr.
Alteration of Water Gas Sets to Increase Capacity.....Carl Schlagel
Dust Deposits in Mains and Services.....Charles R. Henderson
The By-Product Coke Oven and Its Place in the Gas Industry
A. H. Harris, Jr.
Progress to Date on Steaming Retorts—All Types....L. J. Willien, Jr.
Revivification in Situ.....O. B. Evans
Substitution of Congdon Scrubber Standpipe System for Old Style Standpipes

Reports of Committees:

Cast Iron Pipe Joints Committee.....G. I. Vincent
Cast Iron Pipe Standards Committee.....Walton Forstall
Chemical Committee.....E. C. Uhlig
Refractory Materials Committee.....H. L. Underhill
Consumers Meters Committee.....George Wehrle
Carbonization Committee.....James A. Brown
Electrolysis Committee.....J. D. vonMaur

Manufacturers' Section.

Papers:

Factory Costs and Overhead.....F. E. Seeley, Portchester, N. Y.
Unsold Market for Gas

(*Continued from page 377*)

one or more of its men to this biggest of gas conventions at the biggest hotel of the world, has a right to expect a vigorous, complete and stimulating report.

New Ideas at Exhibition

It is of interest to note that the Accounting Section of the Association is urging its members to attend the Exhibition, for among the unusual features which the Committee has prepared, will be demonstrations of gas office labor saving equipment, designed to lessen the labor and increase the efficiency of handling the clerical and accounting work, of which every gas company must do so great an amount under such high pressure. There will be material of value to every gas company accountant in the paper on "Bookkeeping Without Books."

The manufacturers of gas appliances and accessories, speaking mainly through the Exhibition, have shown their attitude toward this Prosperity Convention by applying for exhibition spaces far in excess of the number provided by the original plans. Fortunately, it has been possible to secure additional floor space at Hotel Pennsylvania and to make rearrangements. The manufacturers are expecting real returns on their investments because they believe that the gas companies and their men will be present and they are willing to leave with the latter the decision as to the value of appliances, apparatus and accessories which they will place on display.

The offer of the manufacturers to provide two prizes for the two best papers on the Exhibition, is being properly ad-

vertised to all eligible contestants—gas men present at the Convention.

A $100 Victory Loan Note will be given to the gas man who presents the best paper on impressions created by the Exhibition, and benefits received from a visit to it, together with constructive criticism and suggestions which will assist the Committee in planning future displays. The second prize will be a Victory Loan Note of $50.

Hotel Pennsylvania, Headquarters

Arrangements have been made whereby the Secretaries of the Sections, the Secretary-Manager and the Assistant Secretary-Manager will take up their residence at Hotel Pennsylvania during the time of the Convention. This will facilitate the carrying on of the great mass of business which will fall to the share of each of these men, and will make them available to all out-of-town members who select the Hotel Pennsylvania as their headquarters.

All reservations for rooms must be made directly to the hotel, Mr. Roy Carruthers, Resident-Manager, and requests should state as definitely as possible, location and kind of rooms desired, date of arrival, and number in party. August 1 is none too early to settle this matter of reservations and all members who plan to attend the Convention are urged to make their arrangements at once. The following list of room rates is reprinted from the June issue of the MONTHLY.

Rooms with double bed (for one)—$4.00, $5.00 and $6.00.
Rooms with double bed (for two)—$5.00, $6.00 and $7.00.
Rooms with twin beds (for one or two)—$6.00, $7.00 and $8.00.
Parlor suites— $12.00 and up.

Nominating Committees of A. G. A. Sections

The following committees have been appointed by the Managing Committees of the various Sections to report a slate of officers as nominees for Chairman and Vice-Chairman of their respective Sections, for 1919-1920:

Accounting Section:

Wm. Schmidt, Jr., Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
H. M. Brundage, Consolidated Gas Co. of New York, New York, N. Y.
E. C. Scobell, Rochester Railway & Light Co., Rochester, N. Y.

Commercial Section:

Wm. J. Clark, Westchester Lighting Co., Mt. Vernon, N. Y.
F. W. Frueauff, Henry L. Doherty & Co., New York, N. Y.
H. C. Abell, American Light & Traction Co., New York, N. Y.

Manufacturers' Section:

Wm. Crane, 16 W. 32d St., New York, N. Y.
W. P. Hutchinson, Sprague Meter Co., Bridgeport, Conn.
H. D. Schall, Detroit Stove Works, Detroit, Mich.
W. E. Steinwedell, Gas Machinery Co., Cleveland, Ohio.
A. F. Traver, Henry L. Doherty & Co., New York, N. Y.

Technical Section:

George T. Macbeth, Westchester Lighting Co., Mt. Vernon, N. Y.
R. B. Harper, Peoples' Gas Light & Coke Co., Chicago, Ill.
F. C. Freeman, Providence Gas Co., Providence, R. I.

The Beal Medal

AS announced in our last issue, the gold medal originally presented by Mr. William A. Beal to encourage a high standard among convention papers, will be continued in the American Gas Association, through the courtesy of his son, Mr. T. R. Beal. The American Gas Association has accepted the offer and the medal will be awarded for the best technical paper presented at the Convention of October, 1919, by a committee consisting of Messrs. George B. Cortelyou, John B. Klumpp, Alfred E. Forstall and William E. McKay.

The Beal Medal was first offered to the American Gas Light Association in 1897 at the Annual Meeting held in October of that year, at Old Point Comfort, Va. The Report of the Council, recorded in the Annual PROCEEDINGS of the American Gas Light Association, Vol. XIV, page 9, reads as follows:

"Mr. W. R. Beal having offered to present annually a gold medal to the writer of the most valuable paper presented at each meeting, the Council accepts the offer with thanks and recommends that it be known as the Beal Medal and that it be awarded by a committee of three, appointed by the President from among the Past Presidents."

In 1906 the Beal Medal was offered to the American Gas Institute, the successor of the American Gas Light Association. The obverse and reverse sides of the Beal Medal are shown above. Two inches in diameter, 11/64 inch thick; it contains 5 ounces of gold and is enclosed in a handsome case.

The holders of Beal Medals and the titles of the papers for which they were awarded are given here:

1898—Henry L. Doherty, A. G. L. A.
How Can We Make the Use of Gas for Cooking More Universal.

1899—Arthur G. Glasgow, A. G. L. A.
Carbureted Water Gas as a Coal Gas Auxiliary.

1902—Isaac N. Knapp, A. G. L. A.
Notes on Cement Masonry.

1904—Brewster H. Spangenberg, A. G. L. A.
Consumers Meters.

1905—Henry L. Rice, A. G. L. A.
High Pressure Distribution.

1906—William H. Gartley, A. G. I.
The Delivery of Uniform Candlepower

to the Consumer Through All Seasons of the Year.

1908—Walter Herbert Fulweiler, A. G. I.
The Physical Theory of Coal Carbonization.

1909—Charles J. Ramsburg, A. G. I.
Sulphur Compounds in Illuminating Gas.

1910—Herbert W. Alrich, A. G. I.
Brick, Concrete and Steel Holder Tanks.

1911—Leigh E. Worthing, A. G. I.
Some Principles of Condensation with Especial Reference to Water Gas.

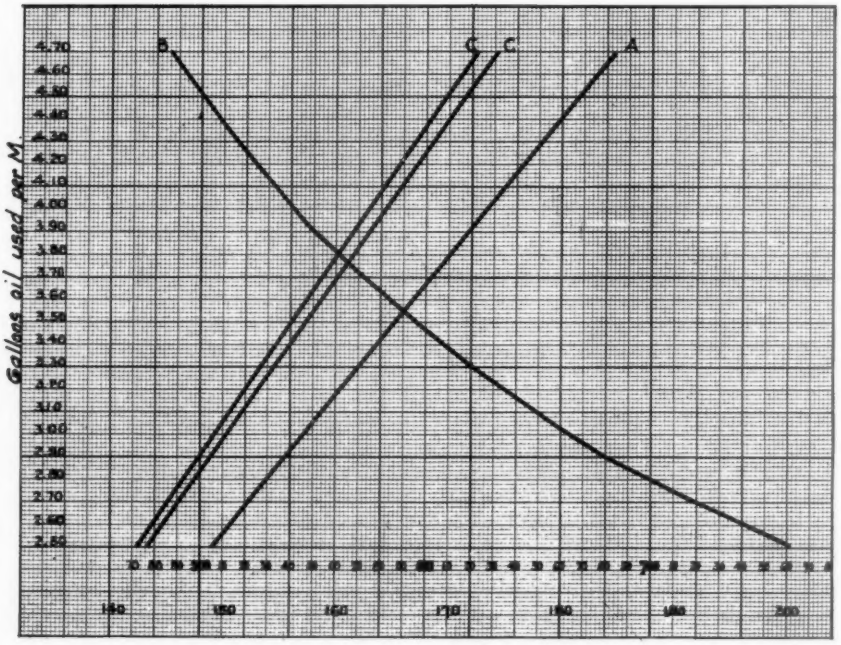
1912—Charles O. Bond, A. G. I.
Photometry of Incandescent Gas Lamps.

1913—Owen Brooke Evans, A. G. I.
Some Notes on the Carbonization of Coal in Vertical Retorts.

1914—F. W. Steere, A. G. I.
An Electrical Process for Detarring Gas.

A New British Thermal Unit Chart

E. H. EARNSHAW



Top line of figures = B. t. u. per cu. ft.
Lower line of figures = B. t. u. per gal. of oil used per M.

Curve A gives B. t. u. per cubic foot in carbureted water gas, oil per M being known.
Curve B gives B. t. u. per gallon oil used per M carbureted water gas.
Curve C and C' gives B. t. u. per cubic foot in carbureted water gas after removal of light oil.

DATA.

1 gallon oil gives 81.5 cubic feet of 1,300 B. t. u. oil gas.
Blue Gas = 300 B. t. u. per cubic foot.
B. t. u. of carb. water gas = oil per M × 81.5 + 300.

$$\text{Oil per M} = \frac{\text{B. t. u.} - 300}{81.5} \text{ gals.}$$

$$\text{B. t. u. per gallon oil} = \frac{\text{B. t. u.}}{\text{oil per M}}.$$

Light oil = 130,000 B. t. u. per gallon.
Light oil recovered = 0.11 gallon per gallon oil used.
Light oil recovered contains 10 per cent. wash oil.
Loss in volume of gas = 29 cubic feet per gallon of light oil recovered, less wash oil.
Curve C makes no allowance for loss in volume and shows actual loss in B. t. u.
Curve C′ allows for reduction in volume and shows actual B. t. u. of washed gas.

E. H. EARNSHAW.

THE question is often asked, "How much oil per M will it take to make gas of a specified B. t. u. per cubic foot?" The answer is apt to be uncertain, unless based on actual experience in producing gas of such specified heating value.

The B. t. u. chart here shown has been designed to give a quick answer to such a question and also to show the B. t. u.'s that should be obtained per gallon of oil used per thousand of water gas made. Curves C and C′ give further information with regard to the loss in B. t. u.'s by scrubbing the gas for recovery of light oil.

In studying the relation of oil per thousand to resulting B. t. u.'s the writer has found that this relation can be expressed by a simple formula derived as follows:

Let: 1 = a unit vol. (one cubic foot) of carb. water gas.

a = vol. of oil gas in one cubic foot of carb. water gas.

$1-a$ = vol. of blue gas in one cubic foot of carb. water gas.

b = B. t. u. in one cubic foot of oil gas.

c = B. t. u. in one cubic foot of blue gas.

d = vol. of oil gas produced by one gallon of oil.

x = B. t. u. per cubic foot of carb. water gas.

y = gallons of oil used per thousand of water gas.

(1) $x = ab + c\ (1-a)$.

(2) $a = \frac{dy}{1,000}$.

Substituting $\frac{dy}{1,000}$ for a in equation (1) we get:

(3) $x = \frac{bdy - cdy}{1,000} + c$.

We may safely assume the average value of c to be 300, and we may also reasonably assume the value of b at 1,300.

Substituting these values for b and c in equation (3) we get:

(4) $x = dy + 300$.

(5) $y = \frac{x - 300}{d}$.

The writer has found by an experience extending over a period of years with one grade of oil, that 3.68 gallons per thousand are required to produce 600 B. t. u. water gas.

These values for x and y give a value of 81.5 for d in equations (4) and (5), so that for an oil efficiency represented by "3.68 gallons of oil per thousand = 600 B. t. u.," the equations become

x = B. t. u. per cubic foot = $81.5\ y + 300$.

y = gallons of oil per thousand =

$$\frac{x - 300}{81.5}.$$

The chart reproduced herewith has been calculated on this basis of efficiency and curve A shows B. t. u. per cubic foot corresponding to known gallons of oil used per thousand or *vice versa*.

The zero of the chart is at O oil per thousand and 300 B. t. u. per cubic foot, and curve A is a straight line. It is, therefore, a simple matter to construct a curve representing an oil efficiency corresponding to any particular character of oil or other operating conditions. It is only necessary to fix one point in the curve and then draw a line through this and the zero point. The formulae may be modified to suit any set of conditions.

For instance, if the operating conditions at any works are such that an efficiency of 2.75 gallons per thousand = 530 B. t. u., is obtained, the formulae become:

x = B. t. u. per cubic foot = $83.6\ y + 300$.

y = gallons of oil per thousand =

$$\frac{x - 300}{83.6}.$$

This would give us for 600 B. t. u. gas—

3.59 gallons oil per thousand = 600 B. t. u. per cubic foot.

Curve B solves the equation.

B. t. u. per gallon of oil =

$$\frac{\text{B. t. u per cubic foot}}{\text{oil used per thousand}}.$$

It is evident that the remark often heard, "We are getting so many B. t. u.'s per gallon" means nothing unless the oil used per thousand is also stated.

Curves C and C′ show the loss in B. t. u.'s per cubic foot due to the recovery of .11 light oil per gallon of oil used per thousand, the light oil being assumed to contain 10 per cent. of wash oil.

It has also been assumed that a conservative figure for the heating value of the light oil is 130,000 B. t. u. per gallon, and that the volume of the gas is reduced 29 cubic feet for each gallon of oils removed from the gas.

Let us take for example:

626 B. t. u. water gas in the manufacture of which 4.00 gallons of oil per thousand have been used.

Light oil recovered per thousand = $4.00 \times .11 = 0.44$ gallons.

Light oil, less 10 per cent. wash oil = 0.396 gallons.

Total B. t. u.'s lost by recovery of light oil = $0.396 \times 130{,}000 = 51{,}480$.

Or, 51.48 B. t. u. per cubic foot of gas scrubbed.

However, the volume of gas has been reduced by loss of oil vapors from 1,000 cubic feet to 988.5 cubic feet so that the heating value of the scrubbed gas will be 554.9 B. t. u. or an apparent loss of only 45.1 B. t. u. per cubic foot.

Curve C gives the actual loss in British thermal units per cubic foot of gas scrubbed, and curve C′ gives the British thermal unit per cubic foot of the gas as reduced in volume by recovery of light oils.

May, 1919.

Chemical Committee Makes Progress in Revision of Gas Chemists' Handbook

THE fifth monthly meeting of the Chemical Committee was held at the Association offices, on Tuesday, June 24, 1919.

The Chairman, Mr. E. C. Uhlig, reported that the joint paper, "Value of the Chemist to the Gas Plant," by Messrs. E. J. Murphy and H. Vittinghoff, would soon be ready for approval. Mr. W. H. Gartley has consented to prepare a paper on the value of the chemist to the gas industry through research work and development of by-products, to be presented as the contribution of the Technical Section at one of the general sessions of the Convention.

The Committee was largely occupied with discussion of the following subjects as affecting the revision of the Gas Chemists' Handbook:

Purification materials; water analysis, E. C. Uhlig.

Refractories, cement and steel, W. H. Fulweiler.

Gas oils, R. B. Harper.

Alloys, solder, brass and Babbitt metal, O. L. Kowalke.

Ammonia liquor, ammonium sulphate and lime, C. E. Lewars.

Cyanogen in gas, oxide, press cake and cyanogen mud; paints; deposits from gas, Dr. E. G. Love.

Gas analysis; impurities in gas, such as ammonia, total sulphur, hydrogen sulphide, naphthalene, carbon bisulphide, iron carbonyl, R. S. McBride.

Coke, analysis and sampling; light oils, F. W. Sperr, Jr.

Coal (anthracite and bituminous), analysis and sampling, C. C. Tutwiler.

Lubricating materials, R. G. Griswold.

Tar, pitch, creosote and road compounds, S. R. Church.

Mr. C. E. Lewars presented his complete report concerning the chapter assigned to him, and announced that necessary changes would include a revision of the following methods:

Conversion Factors.

Analysis of Ammonia Liquor:
Sampling of weak ammonia liquor; still waste; strong liquor in storage tanks; strong liquor in cars.

Analysis of Weak Liquors:
Apparatus required; total ammonia; free ammonia; fixed ammonia; ammonia in still waste; carbon dioxide in weak liquors; sulphides in weak liquors; chlorides; organic matter; pyridine; lime in still wastes.

Analysis of Strong Liquors:
Percentage of free ammonia; percentage of total ammonia; carbonates; sulphides in concentrated liquors; organic matter; pyridine in strong liquor.

Analysis of Ammonium Sulphate:
Sampling; pyridine; organic number; moisture; insoluble residue; free acid; cyanides.

Analysis of Crude Sulphuric Acid:
Sampling; specific gravity; acid content; acid in saturator liquor; arsenic in sulphuric acid.

Analysis of Lime:
Sampling; active lime; distillation method; direct titration residue in lime; sugar method; ammonium chloride method; residue in lime; magnesium oxide.

Solutions in Testing Ammonia Liquors, Sulphate, Sulphuric Acid and Lime.
Preparation of indicators; phenolphthalein solution; methyl orange; methyl red; cochineal; starch solution.

Standardization of Solutions:
Acids and alkalies; sodium carbonate method; benzoic acid method; stand-

ardization of N/10 iodine solution; standardization of potassium permanganate.

The Chemical Committee decided that, because of the extent of the work necessary to revise and bring up to date the Gas Chemists' Handbook and the care required in its final editing it would not be possible to submit a completed report this year. It has been the aim of the present revision to make the Gas Chemists' Handbook an absolutely standard work for all laboratory methods required in gas company operations. The Committee feels, therefore, that the value of a handbook of this character to all gas chemists justifies carrying the work over into the next year.

A report of the work accomplished by the Committee to date will be prepared by the Chairman and submitted to the Managing Committee in August.

Progress Reports from Technical Committees

AT a meeting of the Managing Committee of the Technical Section of the American Gas Association, held on June 19, the chairmen of various committees submitted progress reports, all of which gave good indications that the work now under way would be ready for final approval in August.

Cast Iron Pipe Joints Committee

The alternate design for standard bells as described on page 331 of the A. G. A. MONTHLY for June will be presented to the industry as a tentative standard, with the joint endorsement of the Cast Iron Pipe Joints, and the Cast Iron Pipe Standards Committees. The design is based on extensive laboratory experiments conducted by the Committee and the practical experience of its members. The increasing use of combination joints in mains, 8 inches and larger, and the dissatisfaction with the present standard bell have led many engineers to specify modifications in which each engineer follows his own ideas concerning design. Distribution men will, therefore, await with interest the proposed bell which is designed especially for combination joints. Its general adoption will prevent a growing lack of uniformity, improve the installation and make for economy for both the manufacturer and the user.

The Committee is not ready to recommend the bell for all cement joints until it has been proven in practice. Arrangements have been made, however, for practical tests and the results will be reported as soon as possible.

Consumers Meters Committee

The work of compiling the Committee's report from replies received to a questionnaire sent out by the Chairman is proceeding. (See page 332 of the A. G. A. MONTHLY for June.) The necessity for considerable work preliminary to the adoption of complete standards will prevent the Committee's covering this year the entire field of proof testing meters. Definite recommendations, however, will be submitted on:

The proving of meters by check test only or by check and open test with adjustments for the two tests.

A complete schedule of check test caps designed to produce a uniform loss of 3/10 inch pressure on all meters.

Present schedules specifying 6 feet per light per meter produce variations in differential pressures from 1 to 7/10 inch and the schedule to be recommended is designed to correct this lack of uniformity.

Carbonization Committee

Notes have been received by the Chairman from practically all members of the Committee, outlining improvements in carbonization since the last report of the Carbonization Committee of the American Gas Institute. These will be made the basis of the Committee's report, which will be prepared by a subcommittee consisting of the Chairman and two operating members.

As the Carbonization Committee includes representatives of coke oven companies, its report, together with the paper, "The By-Product Coke Oven and Its Place in the Industry," will provide much material for discussion by members interested in coke oven gas.

Refractory Materials Committee

The Committee will submit its final report shortly after its meeting in Atlantic City at the Convention of the American Society for Testing Materials. Committee C-8 of this Society, with which the American Gas Association committee has been in active co-operation, will present at Atlantic City tentative standard tests and definitions for the essential properties of refractory materials.

As the standards adopted by the American Society for Testing Materials will be generally observed, it has been the aim of the Refractory Materials Committee to keep before Committee C-8, the essential properties of refractories for use in the gas industry and to see that such specifications are duly considered.

Papers Committee

Definite progress in the preparation of papers for the technical sessions of the A. G. A. Convention was reported. Mr. L. J. Willien, Jr., has collected considerable data on results obtained abroad in steaming various types of retorts and has received some interesting figures from Portland, Maine, and Rochester, N. Y. Additional material has been promised from Holyoke, Schenectady and New Haven, which, with Mr. Willien's own figures, will make the presentation of this important subject most complete.

A. G. A. Committee on Accident Prevention

THE American Gas Association Committee on Accident Prevention, under the chairmanship of J. B. Douglas, of Philadelphia, is convinced that it has in hand a matter of such importance to both life and property that it can, with confidence, claim the assistance of the gas industry. Therefore, with a true spirit of service, the Committee has undertaken to secure the co-operation of all gas companies in the collection of data which will lead to the disclosing of causes of accidents to gas company employees and to practical suggestions for the prevention of such accidents.

A blank form has been printed to facilitate the reporting of accidents to employees of gas companies. This calls for the company's name and location; the date of the accident, and the hour; the age, occupation, and department of the injured man; his rate of pay, the length of his employment by the company and a note as to his ability to speak English.

Concerning the accident itself, the company is asked to report the actual or

estimated number of days of disability, the cause and circumstances leading up to the accident, the nature and extent of the injury, and suggestions for devices and precautions which would prevent a recurrence of such mishaps. The company is also asked to report the estimated number of employees on its gas payroll at the time of the accident.

A blank half page is left for additional data, and a list of occupations is given to simplify the classification of employees.

It is clear that the blank can be filled in by the manager or foreman of the gas company in a very few minutes and in view of this fact the Committee hopes to receive a large number of reports. Certainly, even though the reports required more time to fill out, no gas company would be justified in withholding information that will tend to increase the safety of men and women in our industry.

The appeal for co-operation of all gas companies has been made through the following letter, sent from the offices of the chairman of the Committee:

"It being the intention of our Committee to continue to make analyses of accidents to employees of the gas industry while on duty, a supply of blank forms for reporting such cases has been sent to you.

"Upon receipt of the information desired we shall make analyses to determine the predominating causes of accidents and the order in which they occur. We shall also suggest measures to reduce the accident frequency in the gas industry.

"We wish to begin analyzing the cases as soon as possible, and I would, therefore, suggest that you send as many reports as you can, dating back to the first of the year. We are only asking for reports of cases resulting in loss of time or disability extending beyond the shift or day in which the employee is injured.

"I solicit your co-operation to the fullest extent. We shall be glad to send you additional blanks as they are desired."

In addition to appealing to the interest of our members in their own prosperity and safety, and to their loyalty in assisting the activities of the Association, we wish to remind them that when such prominent and busy men as constitute this Committee give their services on a problem of such vital importance, it behooves the rest of us to assist in every possible way. If you have not received the report blanks, send for them at once, and contribute your data on one or more cases to make the work of the Committee worth while.

COMMITTEE ON ACCIDENT PREVENTION

J. B. Douglas, Chairman, The United Gas Improvement Co., Philadelphia.
H. E. Almberg, Consolidated Gas Co. of New York, N. Y.
H. N. Cheney, Boston Consolidated Gas Co., Boston.
E. H. Earnshaw, Public Service Gas Co., Newark.
C. E. Paige, Malden & Melrose Gas Light Co., Malden.
C. B. Scott, Bureau of Safety, Chicago.
G. O. Smith, H. L. Doherty & Co., New York.
C. H. Stewart, The Laclede Gas Light Co., St. Louis.

Canadian Gas Association Convention August 21 and 22, 1919

Mr. G. W. Allen, Secretary of the Canadian Gas Association, has announced as a feature of the Convention, a trip from Toronto by special boat across Lake Ontario to Queenstown, and thence by radial to Niagara Falls, Ont. The boat will leave Toronto at 2 P. M., on August 20; the return journey by this route will be made on August 23. Return transportation, $3.10, can be purchased from the Secretary. Hotel reservations must be made through Secretary of the Canadian Association, and on a European plan, rates at Clifton House, range from $2.00 per day up.

Mr. Allen is promising an excellent program and all things point to a very successful and helpful convention.

Gas Doubles Production in Given Space

INDUSTRIAL FUEL ENGINEERING SERVICE

Brazing Brass Tubing

IT required a visit of only one day from the Association's Industrial Fuel Engineer to show the Bristol Brass Corporation of Bristol, Conn., the overwhelming advantages of gas in preference to coal for brazing brass tubing. The particular points which carried most weight, in this case, were the saving of floor space and of time. In fact, it was when the manager found himself confronted on one side by the necessity for increasing the number of furnaces in use and on the other, by the equally serious problem of extensive rearrangements that must be made if two new coal furnaces were to be installed, that he first paused to consider the possibilities of gas.

Under the old method, two coal-fired brazing furnaces were used. The consulting engineer of the plant insisted upon the advantages of increasing the output of brazed tubes but he had no space available for additional equipment. When Mr. Ehlers opened the discussion of his problems with him, he also admitted that production suffered by a serious loss of time in keeping up coal fires, while several men had to be paid for extra time each morning, to build up the fires.

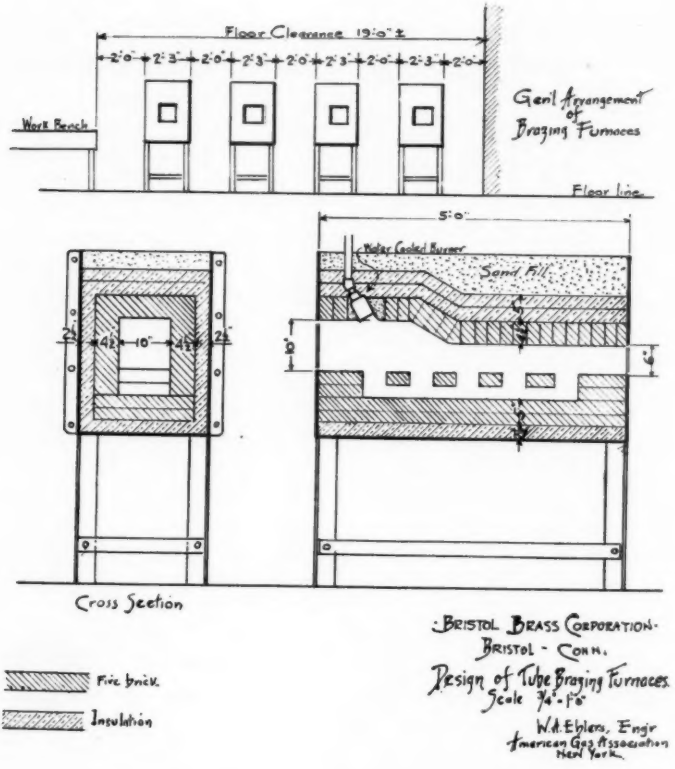
After an inspection of the space then occupied by the old furnaces and a consultation concerning their approximate capacities for brazing tubes of sizes varying from ¾ inch to 2 inches in diameter, Mr. Ehlers designed a set of four gas furnaces which occupied exactly the same space. Thus 100 per cent. was added to the furnace capacity of the plant without taking up more floor space or disturbing the arrangements of the plant at all.

The saving of time was also no small consideration. The idleness of operators and of equipment while waiting for fires to get a proper start, during the early part of the day, and the recesses made necessary during working hours when fires died down, have been entirely eliminated. These important advantages have been gained in addition to the many others which gas as an industrial fuel always carries with it. The Bristol Brass Corporation lost no time in approving Mr. Ehler's suggestions for suitable burner equipment for the new furnaces, which are shown in the accompanying cut. Attention may also be called to the fact that the processes involved and the equipment required follow closely those described in the article concerning an installation in Rome, N. Y. (See page 260.)

The furnaces are 5 feet long, having an opening at the entrance end, 6 inches high by 10 inches wide. At the discharge end the opening is 10 inches square. The burner is applied at the top at an angle away from the operator, and is cooled by the free circulation of cold water. The floor of the furnace is made of firebrick in the form of a grid so that a portion of the heat can circulate around the tubing, and thus prevent overheating of the bottom part of the tube which would result from the excessive reflection of radiant heat if the floor of the furnace were built solid.

Japanning Springs

During his stay of one day at Bristol, the Association's industrial fuel engineer found time to consult with the Wallace Burnes Company, at whose plant 27,000 spring steel trouser guards for the use of bicycle riders are produced



daily. The guards require japanning and for this work the manufacturers were using three indirect coal-heated ovens. By this method, the ovens were loaded at about 5 P. M., the fires started and maintained until 10 P. M., after which the load was allowed to cool until morning. This baking operation by night was both very slow and very troublesome.

Through Mr. Ehler's efforts the company has now purchased one truck-type, gas-fired oven which, while it displaces all three of the old ovens, does not occupy as much space as one coal-fired oven. The new system uses three trucks and permits of a continuous baking process throughout the day. Truck No. 1 is in the oven being baked; truck No. 2 is cooling and truck No. 3 is being loaded. When truck No. 1 is removed from the oven and set to one side for cooling, truck No. 3 is immediately run in and truck No. 2 brought forward for unloading and reloading. Thus one oven handles the same amount of the product in one day as the three old ovens handled in one night, and a saving of 60 per cent. of floor space has been effected in addition to the better working conditions, and we dare say, an actual saving in fuel.

(N. B. Details of these installations will be furnished by Mr. Ehlers to any member of the American Gas Association who desires help in similar installations required in his own territory. Address American Gas Association, 128 E. 15th St., New York, N. Y., Industrial Fuel Service.)

Window Displays Show Progressive Companies

THE prominent gas man who recently told the story of a lump of coal to an audience of deaf and dumb men, by means of sign language, was only doing in more unusual form and for a more selected audience, what every successful merchandiser of to-day recognizes as an essential part of his advertising methods. He was telling his story to the eye rather than to the ear. Picture language might almost be called the language of the day. Newspapers, magazines, car-cards, tell the story in pictures, reserving words and discourses for those whose special interest—one might almost say, whose intention to buy—brings them forward for extra information. The moving picture theatres have certainly increased rather than counteracted the inclination of the public to get its stories in pictures rather than in books.

It is so much easier, so much quicker, to acquaint the prospective buyer with the size, shape, and color of the product to be sold, not to mention giving him an idea of how that product will look in use, by means of a picture, than by means of a description. It is so easy, in fact, for the human mind to grasp information thus presented, that before printing became so common, facts of history, doctrines of theology, the laws of the church and state were explained to the people by means of pictured presentations instead of by the printed page.

Moreover, the modern buyer has been trained, if any training has been required, to gather a very large part of his information concerning goods offered for his consideration, from the "pictures" contrived by the tradesman.

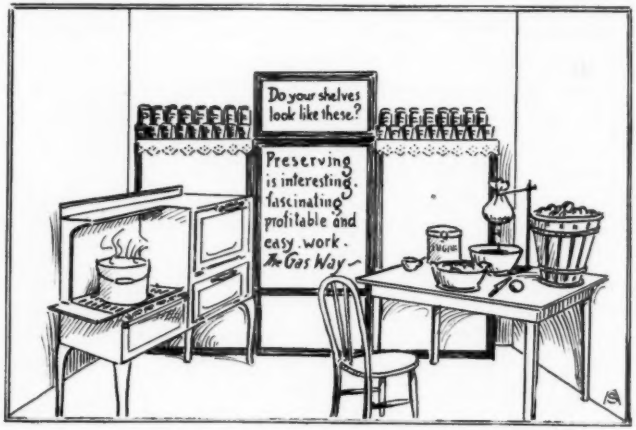
The most vivid and commanding form of such pictures, is the window display. Not a town of any size but has its main street, the chief feature of which is the appeal of its merchandise to the eye. And when every conceivable necessity and luxury of life is insinuated into the attention of the passerby until he expects, even enjoys such a demand upon his attention, where is the gas man who refuses to consider the selling of his goods and his service through the plate glass front of his offices?

Walk up any retail business street—more and more it is also true in wholesale districts—and you will soon be convinced that it is the exceptional store which does not show its goods. Take any woman with you on the inspection and get her opinion. She will either miss entirely the firm that neglects its display windows, or she will tell you that it is an undesirable place in which to buy. It flatters her pride to have the merchant make an open bid for her attention and trade—to come to his front door to greet her, so to speak; and it is admitted more and more that women are the real buyers of almost every line of goods.

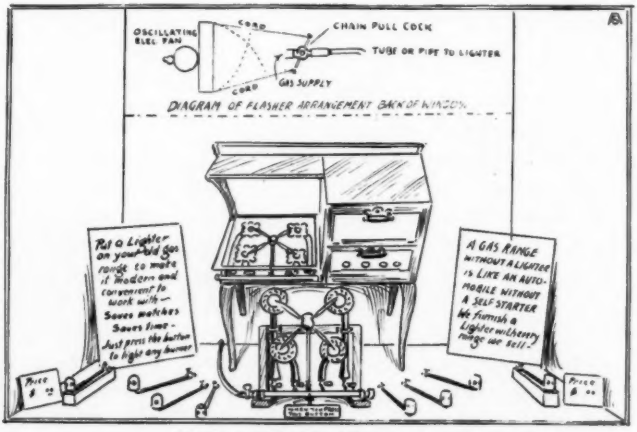
The prospective buyer, the shopper, expects merchants who have materials which they really desire to sell, to indicate by their show windows the quality and nature of the goods and the grade of service to be expected. The gas man must comply with this demand or be the loser. Surrounded as he is by merchants who make the most of women's desire to purchase from stores that put up a good front, the gas man cannot change the facts.

The A. G. A. Window Display Service is sent each month to all company members of the Association. Four attractive, forceful designs that will sell merchandise and build up a "tone" for the gas company are offered, together with instructions for their installation. The sketches below are reproduced from the July service.

See that these service sheets reach the hands of the window display man in your organization, and above all, see that the window space which your company has at its disposal is used for clean, clear-cut interesting displays that will win the respect of the passerby and help sell your goods.



"Cool Comfort and Food Conservation"


OSCILLATING ELEC. FAN
CORD
CHAIN PULL COCK
TUBE OR PIPE TO LIGHTER
GAS SUPPLY
CORD
DIAGRAM OF FLASHER ARRANGEMENT BACK OF WINDOW
Put a Lighter on your old gas range to make it modern and convenient to work with—
Saves matches
Saves time—
Just press the button to light any burner
A GAS RANGE WITHOUT A LIGHTER IS LIKE AN AUTOMOBILE WITHOUT A SELF STARTER
We furnish a Lighter with any range we sell.
PRICE $ ..
PRICE $ ..

Mechanical Display of Range Lighters

Classified Directory--Manufacturers of Gas Equipment

Company Members Only, American Gas Association, Inc.

ARC LAMPS (Gas)
- General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
- Welsbach Co., Gloucester, N. J.

BENCHES
- Russell Engineering Co., St. Louis, Mo.

BENCH IRON WORK
- Isbell-Porter Co., Newark, N. J.
- Russell Engineering Co., St. Louis, Mo.
- The Bartlett Hayward Co., Baltimore, Md.
- The Gas Machinery Co., Cleveland, Ohio
- The Improved Equipment Co., 60 Wall St., New York, N. Y.
- The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
- The Stacey Mfg. Co., Cincinnati, Ohio

BOILERS (Gas)
- Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
- General Gas Appliance Co., 103 Park Ave., New York, N. Y.
- Wm. Kane Mfg. Co., Inc., 1915 Adams St., Philadelphia, Pa.
- Kidde & Co., 169 Chambers St., New York, N. Y.
- F. W. Ofeldt & Sons, Nyack, N. Y.
- The Bryant Heater & Mfg. Co., Cleveland, Ohio
- The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

BOILERS (Gas for House Heating)
- Kidde & Co., 169 Chambers St., New York, N. Y.
- The Bryant Heater & Mfg. Co., Cleveland, Ohio

BOILERS (Waste Heat)
- The Bartlett Hayward Co., Baltimore, Md.

BLOWERS, BOOSTERS, EXHAUSTERS
- Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
- Isbell-Porter Co., Newark, N. J.
- The Gas Machinery Co., Cleveland, Ohio
- The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
- The C. M. Kemp Mfg. Co., Baltimore, Md.
- The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

BRAZING TABLES
- Rathbone, Sard & Co., Albany, N. Y.
- The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

BROILERS (Hotel)
- Geo. M. Clark & Co., Div., Chicago, Ill.
- Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
- Rathbone, Sard & Co., Albany, N. Y.
- The Michigan Stove Co., Detroit, Mich.

BURNERS (Industrial)
- Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
- Equitable Meter Co., Pittsburgh, Pa.
- General Fire Extinguisher Co., Providence, R. I.
- General Gas Appliance Co., 103 Park Ave., New York, N. Y.
- International Hale Gas Mixer Co., Providence, R. I.
- Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
- The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
- The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
- The C. M. Kemp Mfg. Co., Baltimore, Md.
- The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
- The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

BURNERS (Lighting)
- American Meter Co., Inc., 105 W. 40th St., New York, N. Y.
- Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
- General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
- Lindsay Light Co., New York, N. Y., and Chicago, Ill.
- Welsbach Co., Gloucester, N. J.

BY-PRODUCT OVENS
- By-Product Coke Corp., Chicago, Ill.
- Semet-Solvay Co., Syracuse, N. Y.
- The Gas Machinery Co., Cleveland, Ohio
- The Improved Equipment Co., 60 Wall St., New York, N. Y.
- The Koppers Co., Pittsburgh, Pa.
- The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.

BY-PRODUCT RECOVERY APPARATUS
- Isbell-Porter Co., Newark, N. J.
- The Bartlett Hayward Co., Baltimore, Md.
- The Gas Machinery Co., Cleveland, Ohio
- The Koppers Co., Pittsburgh, Pa.

CALORIMETERS
- American Meter Co., Inc., 105 W. 40th St., New York, N. Y.
- D. McDonald & Co., Albany, N. Y.
- Maryland Meter Works, Baltimore, Md.
- Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

CASING, TUBING (Steel)
- National Tube Co., Frick Bldg., Pittsburgh, Pa.

CHARGING COAL
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio

COAL AND COKE (Conveyors, Crushers, Screeners)
R. H. Beaumont Co., 315 Arch St., Philadelphia, Pa.
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio

COCKS (Ranges, Water Heaters, Service and Meter)
A-B Stove Co., Battle Creek, Mich.
Hays Mfg. Co., Inc., Erie, Pa.
Kitson Co., 2837 Oakford St., Philadelphia, Pa.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Standard Brass Works, Detroit, Mich.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Roberts Brass Mfg. Co., Detroit, Mich.

COMPRESSORS
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

CONDENSERS
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Stacey Mfg. Co., Cincinnati, Ohio
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
Steere Engineering Co., Detroit, Mich.

COOKING AUXILIARIES
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
The G. S. Blodgett Co., Burlington, Vt.
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

COUPLINGS
S. R. Dresser Mfg. Co., Bradford, Pa.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

DECALCOMANIA PRODUCTS
The Meyercord Co., Inc., Chamber of Commerce Bldg., Chicago, Ill.

ELECTRIC CONTROLLING DEVICES
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

EXCHANGERS (Heat)
The Bartlett Hayward Co., Baltimore, Md.

EXPERT APPRAISAL
Steere Engineering Co., Detroit, Mich.

EXTRACTORS (Tar, Dust, Fumes)
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.

FITTINGS
A-B Stove Co., Battle Creek, Mich.
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
S. R. Dresser Mfg. Co., Bradford, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
General Fire Extinguisher Co., Providence, R. I.
Kitson Co., 2827 Oakford St., Philadelphia, Pa.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Standard Brass Works, Detroit, Mich.
The Gas Machinery Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Roberts Brass Mfg. Co., Detroit, Mich.
Welsbach Co., Gloucester, N. J.

FITTINGS (Malleable Iron)
Stanley G. Flagg & Co., 1421 Chestnut St., Philadelphia, Pa.

FLEXIBLE TUBING
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Titeflex Metal Hose Corp., Badger Ave., Newark, N. J.

FLASHLIGHTS AND BATTERIES
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.

FUEL BRIQUETTING
General Briquetting Co., 25 Broad St., New York, N. Y.

FURNACES
Eriez Stove & Mfg. Co., Erie, Pa.
Geist Mfg. Co., Atlantic City, N. J.
Russell Engineering Co., St. Louis, Mo.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

GAS ENGINES
The Bartlett Hayward Co., Baltimore, Md.
United Lead Co., 111 Broadway, New York, N. Y.

GAS ENGINE COCKS AND VALVES
Standard Brass Works, Detroit, Mich.

GAS IRONS
A-B Stove Co., Battle Creek, Mich.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Strause Gas Iron Co., Philadelphia, Pa.

GAS MIXERS
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eriez Stove & Mfg. Co., Erie, Pa.
Geist Mfg. Co., Atlantic City, N. J.
General Fire Extinguisher Co., Providence, R. I.
Hays Mfg. Co., Inc., Erie, Pa.
Improved Appliance Co., Inc., 419 Kent Ave., Brooklyn, N. Y.
International Hale Gas Mixer Co., Providence, R. I.
Strait & Richards, Inc., Newark, N. J.
Tate-Jones & Co., Inc., 50 Church St. New York, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

GAS PLANTS (Blue)
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.

GAS PLANTS (Carbureted Water)
Gas Machinery Co., Cleveland, Ohio
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Mfg. Co., Cincinnati, Ohio

GAS PLANTS (Coal) (Engineers)
Camden Iron Works, Camden, N. J.
Isbell-Porter Co., Newark, N. J.
Russell Engineering Co., St. Louis, Mo.
Semet-Solvay Co., Syracuse, N. Y.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Gas Machinery Co., Cleveland, Ohio
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Minjng & Mfg. Co., St. Louis, Mo.
The Stacey Mfg. Co., Cincinnati, Ohio
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio

HEATERS (Room)
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., Hamilton, Ohio
Geist Mfg. Co., Atlantic City, N. J.
General Fire Extinguisher Co., Providence, R. I.
General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
Illinois Specialty Mfg. Co., Bloomington, Ill.
Kidde & Co., 169 Chambers St., New York, N. Y.
Lawson Mfg. Co., Pittsburgh, Pa.
New Process Stove Co. Div., Cleveland, Ohio.
Reliable Stove Co. Div., Cleveland, Ohio.
Reznor Mfg. Co., Mercer, Pa.
Roberts & Mander Stove Co., Philadelphia, Pa.
Strait & Richards, Inc., Newark, N. J.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Mead Gas Heater Co., Delawanna, N. J.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

HEATERS (Garage)
Kidde & Co., 169 Chambers St., New York, N. Y.

HEATERS (Pressing and Soldering Irons)
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Strait & Richards, Inc., Newark, N. J.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

HIGH PRESSURE SYSTEMS
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
General Fire Extinguisher Co., Providence, R. I.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Selas Co., 521 W. 23d St., New York, N. Y.
The Gas Machinery Co., Cleveland, Ohio
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

HOT PLATES
A-B Stove Co., Battle Creek, Mich.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Rathbone, Sard & Co., Albany, N. Y.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Michigan Stove Co., Detroit, Mich.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

Union Stove Works, 20 Beekman St., New York, N. Y.
Weir Stove Co., Taunton, Mass.

INCINERATORS
Estate Stove Co., Hamilton, Ohio
Ruud Mfg. Co., Pittsburgh, Pa.

INSTRUMENTS (Measuring, Testing and Recording)
American Meter Co., 105 W. 40th St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Steere Engineering Co., Detroit, Mich.

KILNS (For Firing Glass, China and Pottery)
B. F. Drakenfeld & Co., Inc., 50 Murray St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Russell Engineering Co., St. Louis, Mo.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

LIGHTERS (Ranges)
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Safety Gas Lighter Co., Haverhill, Mass.
Strause Gas Iron Co., Philadelphia, Pa.
The Michigan Stove Co., Detroit, Mich.
Welsbach Co., Gloucester, N. J.

LIGHTING (Fixtures)
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Gas Domes, Portables, etc.)
Will W. Barnes, 31 Chelsea Place, East Orange, N. J.
Kramer Bros. Lamp Co., 585 Broadway, New York, N. Y.
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Glassware)
Shapiro & Aronson, Inc., 20 Warren St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Incidentals)
Storrs Mica Co., Owego, N. Y.

LIGHTING (Mantles)
General Gas Light Co., New York, N. Y., and Kalamazoo, Mich.
Lindsay Light Co., New York, N. Y., and Chicago, Ill.
Welsbach Co., Gloucester, N. J.

METAL RECEPTACLES
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.
United Lead Co., 111 Broadway, New York, N. Y.

METERS
American Meter Co., 105 W. 40th St., New York, N. Y.
Cleveland Gas Meter Co., Cleveland, Ohio
Equitable Meter Co., Pittsburgh, Pa.
John J. Griffin & Co., 1521 Race St., Philadelphia, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Metric Metal Works, Erie, Pa.
Rotary Meter Co., 52 Vanderbilt Ave., New York, N. Y.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Cleveland Rotary Meter Co., Cleveland, Ohio
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.
The Sprague Meter Co., Bridgeport, Conn.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

METER CONNECTIONS, SEALS, Etc.
American Meter Co., 105 W. 40th St., New York, N. Y.
Cleveland Gas Meter Co., Cleveland, Ohio
S. R. Dresser Mfg. Co., Bradford, Pa.
Equitable Meter Co., Pittsburgh, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co., Albany, N. Y.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
The Lattimer Stevens Co., Columbus, Ohio
The Sprague Meter Co., Bridgeport, Conn.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

METER PROVERS
American Meter Co., 105 W. 40th St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
John J. Griffin & Co., Philadelphia, Pa.
Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
D. McDonald & Co. Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

METER SHELF
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.

OFFICE LABOR SAVING DEVICES
Burroughs Adding Machine Co., Detroit, Mich.
Elliott Fisher Co., Harrisburg, Pa.

OIL (Diaphragm)
John J. Griffin & Co., 1521 Race St., Philadelphia, Pa.

OVENS (Baking and Cooking)
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
General Fire Extinguisher Co., Providence, R. I.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
The G. S. Blodgett Co., Burlington, Vt.
The Crandall-Pettee Co., Hudson St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Ohio State Stove & Mfg. Co., Columbus, Ohio
The Union Steel Products Co., Ltd., Albion, Mich.
The Surface Combustion Co., 366 Gerard Ave., Bronx, N. Y.

OVENS (Annealing, Japanning, Drying, Core, etc.)
Gehnrich Indirect Heat Oven Co., Inc., 62 Franklin Ave., Brooklyn, N. Y.
General Fire Extinguisher Co., Providence, R. I.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The C. M. Kemp Mfg. Co., Baltimore, Md.
The Surface Combustion Co., 366 Gerard Ave., New York, N. Y.
The Union Steel Products Co., Ltd., Albion, Mich.
Young Bros. Co., Detroit, Mich.

OVENS (Warming)
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
The G. S. Blodgett Co., Burlington, Vt.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Union Steel Products Co., Ltd., Albion, Mich.

PHOTOMETERS
American Meter Co., 105 W. 40th St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Nathaniel Tufts Meter Works, Boston, Mass.

PIPE
Camden Iron Works, Camden, N. J.
General Fire Extinguisher Co., Providence, R. I.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE CASTINGS AND SPECIALS
Isbell-Porter Co., Newark, N. J.
The Bartlett Hayward Co., Baltimore, Md.
The Stacey Mfg. Co., Cincinnati, Ohio

PIPE CLAMPS AND SLEEVES
S. R. Dresser Mfg. Co., Bradford, Pa.

PIPE PACKING
General Fire Extinguisher Co., Providence, R. I.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE TOOLS (Caulking, Cutting, Tapping)
General Fire Extinguisher Co., Providence, R. I.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
United Lead Co., 111 Broadway, New York, N. Y.

PLATE WARMERS
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

PORCELAIN ENAMEL PARTS
(Stoves, Lamps, Linings, Stamping and Spinnings)
Baltimore Enamel & Novelty Co., Baltimore, Md.
Eclipse Gas Stove Co., Rockford, Ill.
The Enamel Products Co., Cleveland, Ohio
The Union Steel Products Co., Ltd., Albion, Mich.

PRESSURE GAUGES
American Meter Co., 105 W. 40th St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
General Fire Extinguisher Co., Providence, R. I.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.

The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Cleveland Rotary Meter Co., Cleveland, Ohio.
The Gas Machinery Co., Cleveland, Ohio
Nathaniel Tufts Meter Works, Boston, Mass.

PUMPS

American Meter Co., 105 W. 40th St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
Nathaniel Tufts Meter Works, Boston, Mass.

PURIFIERS

Camden Iron Works, Camden, N. J.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Cruse-Kemper Co., Ambler, Pa.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Mfg. Co., Cincinnati, Ohio

PURIFYING MATERIALS

Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.

RADIATORS

James B. Clow & Sons, Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eriez Stove & Mfg. Co., Erie, Pa.
General Fire Extinguisher Co., Providence, R. I.
Kidde & Co., 169 Chambers St., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Mead Gas Heater Co., Delawanna, N. J.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.

RANGES (Domestic)

A-B Stove Co., Battle Creek, Mich.
Geo. M. Clark & Co. Div., Chicago, Ill.
Bartlett & Co., Inc., Philadelphia, Pa.
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., Hamilton, Ohio
New Process Stove Co. Div., Cleveland, Ohio.
Rathbone, Sard & Co., Albany, N. Y.
Reliable Stove Co. Div., Cleveland, O.
Roberts & Mander Stove Co., Philadelphia. Pa.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Michigan Stove Co., Detroit, Mich.
The Ohio State Stove & Mfg. Co., Columbus, Ohio
The Peninsular Stove Co., Detroit, Mich.
The A. H. Wolff Gas Radiator Co., 4 Great Jones St., New York, N. Y.
Union Stove Works, 70 Beekman St., New York, N. Y.
Vesta Gas Range & Mfg. Co., Chattanooga, Tenn.
Weir Stove Co., Taunton, Mass.

RANGES (Hotel)

Geo. M. Clark & Co. Div., Chicago, Ill.
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Roberts & Mander Stove Co., Philadelphia, Pa.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Michigan Stove Co., Detroit, Mich.

REFRACTORY MATERIALS

Harbison-Walker Refractories Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Tate-Jones & Co., Inc., 50 Church St., New York, N. Y.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.

REGULATORS (Governors)

American Meter Co., 105 W. 40th St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.
Reynolds Gas Regulator Co., Anderson, Ind.
Steere Engineering Co., Detroit, Mich.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Cleveland Rotary Meter Co., Cleveland, Ohio
The Sprague Meter Co., Bridgeport, Conn.

REPAIRS (Gas Meters and Appliances)

Helme & McIlhenny, 1349 Cherry St., Philadelphia, Pa.
Maryland Meter Works, Baltimore, Md.

RETORTS

Gas Machinery Co., Cleveland, Ohio
Harbison-Walker Refractories Co., Pittsburgh, Pa.

Russell Engineering Co., St. Louis, Mo.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Parker-Russell Mining & Mfg. Co., St. Louis, Mo.

RUST PREVENTATIVE
Superior Laboratories, Grand Rapids, Mich.

SCRUBBERS
Camden Iron Works, Camden, N. J.
Gas Machinery Co., Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Koppers Co., Pittsburgh, Pa.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Mfg. Co., Cincinnati, Ohio

SERVICE BOXES, CLAMPS, Etc.
Camden Iron Works, Camden, N. J.
General Fire Extinguisher Co., Providence, R. I.
Hays Mfg. Co., Inc., Erie, Pa.
H. Mueller Mfg. Co., New York, N. Y., and Decatur, Ill.

STILLS (Benzol, Toluol)
The Bartlett Hayward Co., Baltimore, Md.
The Koppers Co., Pittsburgh, Pa.
The Walter E. Lummus Co., Boston, Mass.

STOVES (Confectioners, Laundry, Tailor)
A-B Stove Co., Battle Creek, Mich.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
The General Gas Appliance Co., 103 Park Ave., New York, N. Y.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

STRUCTURAL STEEL WORKS (Holders, etc.)
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
The Bartlett Hayward Co., Baltimore, Md.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Mfg. Co., Cincinnati, Ohio

TANKS (Ammonia, Oil, Water)
Camden Iron Works, Camden, N. J.
Cruse-Kemper Co., Ambler, Pa.
Gas Machinery Co., Cleveland, Ohio
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Stacey Bros. Gas Construction Co., Cincinnati, Ohio
The Stacey Mfg. Co., Cincinnati, Ohio

THERMOMETERS
American Meter Co., 105 W. 40th St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
General Fire Extinguisher Co., Providence, R. I.
Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.

THERMOSTATS
Gas Machinery Co., Cleveland, Ohio
Kidde & Co., 169 Chambers St., New York, N. Y.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
B. Ryan & Co., 60 E. 10th St., New York, N. Y.
The Bryant Heater & Mfg. Co., Cleveland, Ohio

THERMO VALVES
Pittsburgh Water Heater Co., Pittsburgh, Pa.

THORIUM
Welsbach Co., Gloucester, N. J.

TRENCH WORK
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.

VALVES
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Machinery Co., Cleveland, Ohio
General Fire Extinguisher Co., Providence, R. I.
Isbell-Porter Co., Newark, N. J.
Steere Engineering Co., Detroit, Mich.
The Bartlett Hayward Co., Baltimore, Md.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
The Improved Equipment Co., 60 Wall St., New York, N. Y.
The Stacey Mfg. Co., Cincinnati, Ohio

WATER HEATERS
A-B Stove Co., Battle Creek, Mich.
Bartlett & Co., Inc., Philadelphia, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Humphrey Co., Kalamazoo, Mich.
Kidde & Co., 169 Chambers St., New

York, N. Y.
Lawson Mfg. Co., Pittsburgh, Pa.
Long-Landreth-Schneider & Co., New Brunswick, N. J.
New Process Stove Co. Div., Cleveland, Ohio.
Peninsular Stove Co., Detroit, Mich.
Philadelphia Stove Co., Philadelphia, Pa.
Pittsburgh Water Heater Co., Pittsburgh, Pa.
Rathbone, Sard & Co., Albany, N. Y.
Reliable Stove Co. Div., Cleveland, O.
Ruud Mfg. Co., Pittsburgh, Pa.
The Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
The Bryant Heater & Mfg. Co., Cleveland, Ohio
The Cleveland Heater Co., Cleveland, Ohio
The Hoffman Heater Co., Lorain, Ohio
The Michigan Stove Co., Detroit, Mich.

WATER STILLS (Gas Heated)
The Improved Appliance Co., 419 Kent Ave., Brooklyn, N. Y.
Young Bros Co., Detroit, Mich.

WELDED STEEL PIPE
The Bartlett Hayward Co., Baltimore, Md.
Steere Engineering Co., Detroit, Mich.

(Continued from page 368)

Factors Influencing Decision

Finally on May 15, the Committee met in the Claypool Hotel, Indianapolis, to discuss the results of the whole investigation. It is interesting that, as a result of the investigation, the members of the Committee could agree unanimously on all factors which it believed should be considered in determining the heating value standard, and that when each member, without having discussed the matter with the other members finally named the standard which he believed correct, the difference between the highest and lowest figures amounted to but 15 B. t. u. A discussion of the various factors which led the Committee to its final decision follows:

The fixing of the most satisfactory heating value standard for manufactured gas is at best a task requiring careful consideration and expert judgment. Economic conditions, practical manufacturing considerations, and maximum satisfaction to the consumer are some of the determining factors; and no standard may be said to be correctly set which does not take them all into account.

In the early days of the industry, gas was used almost exclusively for lighting and the brilliancy of its flame was the quality of most importance to the average consumer. The candlepower of manufactured gas increases very rapidly with increase in heating value and it is quite natural, therefore, that during this period high heating values were maintained, though this latter characteristic of the gas was not regularly tested. As time went on, gas came to be used more and more for purely heating purposes; gas ranges and water heaters replaced coal stoves, while mantle lights replaced the inefficient flat-flame burner. Since Municipal and State authorities have gradually come to realize that a better and more uniform service can be maintained in the appliances which have now come into use by enforcing heating value rather than candlepower standards, the latter have in most cases been discarded. In view of the fact that manufacturing methods had already been pretty well established, it is not surprising that many of the early heating value requirements were high, and the existing prices and quality of materials perhaps encouraged this. Some localities even attempted to fix heating value standards to conform as nearly as possible to the quality of the gas which had been produced under their old candlepower regulations. Few attempted to reach an answer through scientific investigation. The Committee is advised, for example, that the standard of 600 B. t. u. per cubic foot first ap-

proved by the Public Service Commission of Indiana in 1914 was selected because Wisconsin had decided on this figure. But a standard suitable for one State may not necessarily prove best for another. The type of plants in use, the character of coals available and other important local questions must be considered. The standard in Wisconsin was set after an investigation of certain plants, most of which made water gas, and under the then existing local conditions, the figure was probably wisely selected. In the present investigation, the Committee has attempted, in all fairness, to reach a decision based on the data obtained, and on a knowledge of local conditions in the State.

The question which must necessarily play one of the most important parts in any such investigation is "What heating value of gas will give the consumer the most satisfaction for his money?" It is not sufficient to say that within certain limits an appliance will give about the same efficiency with one heating value as with another, provided it is properly adjusted. In this the consumer is only mildly interested, but he is mightily interested in the size of his monthly gas bill and also in the avoidance of blackened mantles and cooking vessels, as well as of burners which flash back when he attempts to use them. The gas which will give the mose satisfaction is the one that, under the conditions apt to be met in the consumer's house, will do his cooking and lighting satisfactorily and leave him at the end of the month with the smallest bill; in short, will "boil the most beans for a dollar" and give the least cause to call the gas company complaint department.

Practical manufacturing considerations play a very important part in any attempt to reach this most desirable end, for it is obvious that a gas which may give efficient service may be so difficult or inefficient of manufacture as to make its cost high and, therefore, render it most unsatisfactory to the consumer. Again, it is difficult to maintain the heating value of certain gases constant, with the result that mantles become black and cooking utensils dirty, or burners refuse to work; and thus while the consumer may not find his bill much greater, the service is unsatisfactory. Mere cost is not the sole criterion of satisfaction.

Thus it is evident that the mere averaging of the heating values obtained at the various plants, will not give the answer sought. The consumer is forgotten, economic conditions are forgotten and efficiency is averaged with inefficiency. The standard must be such as to give the consumer a satisfactory service, to permit of economical plant operation—otherwise the service will be expensive—and in general, to conserve the interests of the State as a whole. Due weight must be given to each one of these factors. Thus the Committee approached the final consideration of the subject, convinced that their conclusions must be a matter of judgment based on a thorough knowledge of conditions throughout the State.

Importance of Uniformity

The investigation has convinced the Committee that in any consideration of heating value, uniformity is of paramount importance. The heating value of the gas should be maintained with as little deviation as possible either above or below whatever standard may be fixed. Uniformity is one of the most vital factors in good service. Within reasonable limits the actual average fixed is of less importance. Deviations above the standard are as harmful as those below. A large decrease in heating value will cause inconvenience, the flashing back of stove burners and lights, but no perma-

nent harm is done. But with heating values which are unusually high, cooking utensils become coated with carbon and may lose as much as 25 per cent. in efficiency, mantles become black and often must be discarded, and ceilings are discolored. Thus actual financial loss occurs in addition to the unsatisfactory service. Electric lighting furnishes an analogy: with low voltage, lights will become dim, but if the voltage becomes too high they may be blackened or entirely destroyed.

The Committee found that at Auburn Junction and Vincennes, although the average heating value of the gas was low, yet the service appeared to have become satisfactory as soon as uniformity could be attained. On the other hand, in another municipality, an average of over 600 B. t. u. is maintained but there is a variation of over 100 B. t. u. between the maximum and minimum values. It is understood that this company is flooded with complaints.

The Committee believes that present day appliances can be adjusted to give the consumer an entirely satisfactory and efficient service with any average heating value between 550 and 600 B. t. u. per cubic foot, but tests have shown that they cannot be adjusted to give satisfaction with *variations* amounting to 100 B. t. u. Firmly believing in the importance of uniformity, this Committee makes a new departure. It recommends to the Public Service Commission the adoption of a maximum as well as a minimum limit. It believes that violations of the maximum are to be discountenanced equally with those of the minimum. Furthermore, it believes that the maximum and minimum values should allow of less deviation from the average than has in the past been deemed necessary, and recommends that they be fixed respectively about 5 per cent. above and 5 per cent. below the average value decided upon.

At the outset of the investigation it appeared that the heating value which coal gas plants could produce economically would be the chief factor in determining the standard. More and more, however, the value of uniformity came to be realized until now the Committee believes that the standard should be fixed at a point suitable to the maintenance of a uniform heating value. A standard which the plants must always be straining to comply with, will inevitably lead to wide variations and unsatisfactory service. Furthermore, gas of higher heating value, even if produced with a fair degree of uniformity at the plant, is more apt to be affected during distribution, by changing temperature conditions, with the result that the service to the consumer is often impaired. The Committee further believes that within reasonable limits the use of high heats and other legitimate methods for increasing the yields of gas, even at the expense of heating value, should not be discouraged. Not only is the capacity of the plant increased, with a resulting tendency to decrease the ratio of capital investment to output, but within certain limits the efficiency of the plant and the number of heat units obtained in the gas for each pound of coal carbonized, tend to increase, all of which are factors that lead to ultimate lower cost to the consumer.

On the other hand, the Committee is firmly opposed to any heating value low enough to allow of the admixture of large quantities of diluents. A sharp distinction should always be made between low heating values caused by high heats and those caused by these diluents, as the effects upon service are very different. One hundred per cent. efficiency in operation is manifestly impossible and

small quantities of furnace gases almost inevitably leak through the retorts, and the admission of not over ½ per cent. of oxygen to assist in purification is desirable and considered good practice. In small quantities such diluents should be expected and considered as regular constituents of the gas, and they do no appreciable harm. But in large quantities, they decrease the heating value of the gas and the air requirement for combustion; they increase its specific gravity and the air entraining power; and they decrease the flow through the burner orifice. Every one of these changes in characteristics will tend to bad service, flashing-back of burners, and other troubles with appliances, often resulting in complaints improperly ascribed to poor pressure. Low heating values caused by high heats or light seals are far less objectionable, for accompanied by the reduction in heating value, comes a reduction in specific gravity, and the altered characteristics of the gas tend to offset each other and maintain rather than destroy good service.

Furthermore, heating value requirements which are too lenient inevitably lead to careless plant operation. The apparatus is not kept in proper repair and the morale of the whole organization is lowered. Sooner or later unsatisfactory and expensive service is bound to result.

Thus the Committee recommends for coal gas a heating value low enough to be met and uniformly maintained, provided the equipment is kept in good condition. Finally, it hopes that, if adopted, the heating value figure named by it, will permit, and in fact, encourage the use of some percentage of local coals. Conservation, decreased demand upon our over-taxed transportation systems, and economic advantage to the State will inevitably follow.

Factors in Water Gas Standard

At first it would appear that the fixing of standards for water gas and coal gas would be quite different problems. It is true that water gas can be produced easily and efficiently over a rather wide range of heating values. Practicability of the standard is, therefore, of not such great importance, nor is uniformity so difficult to attain; but otherwise the problem is the same as for coal gas. The economic side of the question, however, assumes greater importance.

Water gas is, in fact, a mixture of two gases, the one of low heating value produced by passing steam over highly heated hard coal or coke, the other of very high heating value produced by gasifying a petroleum distillate. The relative availabilities and prices of coal and oil play a very important part in the fixing of a standard for water gas. At the present time oil is expensive and the quality of that which it is possible to obtain for gasifying is constantly becoming poorer, while on the other hand, there seems to be some prospect of a recession in the price of coal and coke. It would thus seem that the tendency should be a decrease rather than an increase in the heating value standard for water gas. It should be further noted that within reasonable limits the smaller the quantity of oil used, the higher will be the efficiency of its utilization.

The Committee further feels that there are advantages in having the same standard for both coal and water gas. In plants producing both, this is especially desirable, while in a number of coal gas plants having an emergency water gas equipment, difficulties and confusion would be particularly apt to arise were the standards different.

Monthly Average, 570 B. t. u.

Finally, after taking all matters into consideration, after having visited seven-

teen different plants in various parts of the State, and having carefully examined all data collected, the Committee believes that it is qualified to make its recommendations. It recommends to the Public Service Commission the fixing of *a Monthly Average Total Heating Value Requirement for Artificial Gas Manufactured in the State of Indiana at 570 British thermal units Per Cubic Foot.* It further recommends a requirement that the heating value of the gas be maintained with as little deviation as possible from this figure and to this end recommends that the daily average heating value for companies maintaining this standard shall in no case exceed 600 B. t. u. nor fall below 540 B. t. u. per cubic foot.

It is realized by the Committee that cases may occur in which by-product coke ovens and so-called slot ovens may find it uneconomical to manufacture gas having an average heating value of 570 B. t. u. per cubic foot. Each such case should be dealt with by the Public Service Commission on its merits.

It is recommended, however, that in no such case shall the monthly average heating value fixed be less than 550 B. t. u. per cubic foot, with limits of variation in daily average not more than 5 per cent. above and below this average.

It is recommended that the engineering department of the commission be provided with personnel and facilities for such inspection work as is necessary to enforce these standards.

(Signed)

H. O. GARMAN, Public Service Commission of Indiana, *Chairman.*

H. C. PEFFER, Municipal League of Indiana.

J. B. KLUMPP, Indiana Gas Association.

A. I. PHILLIPS, National Bureau of Standards.

Educational Department

Conducted by ALFRED E. FORSTALL

Illuminating Appliances

DESIGN.—The design of the modern gas consuming lamp, although rather complicated in its detail, is worked out on the basis of longest service at highest efficiency. The incandescent gas mantle which forms the light source is designed and manufactured with great care, and the burner of the lamp, on which the mantle is placed, and on which depends the service and degree of satisfaction afforded the consumer, has always been, and still is, the object of careful study. The efficiency of the lamp depends, first, on the mixture in, and the shape of, the Bunsen flame; and second, on the length of time that these conditions can be maintained without attention. This last, of course, depends upon the gas pressure at the burner nozzle.

In view of the large number of lamps on the market, it will be impossible to go further into the details of design. If the student is interested in these details, he can obtain them by examining the appliance itself, or by obtaining the illustrations that sometimes are furnished by the manufacturer.

Connection.—The "preinspection" system is used exclusively with larger installations of illuminating appliances, because each is different from the other. When the number of appliances, and the installation work involved, is small, the preinspection may be made by a fitter who brings with him the materials nec-

essary to complete the work. The location of the appliances is determined, in the larger installations, by the illuminating expert of the gas company; otherwise, or where existing gas outlets are to be used, the preinspector and the consumer may settle this matter with satisfaction.

The following points, which do not take into account the distribution or intensity of illumination, should be considered when deciding on the location.

Fire hazard due to contact of combustion products with inflammable material should be avoided. Specified minimum clearances between lamp and ceiling should be carefully observed. Open flames should be kept away from curtains.

Lamps should be kept far enough from the sprinkler heads of fire extinguishing systems to prevent any possibility of melting the head controls.

The fixture which is to support the lamp should be sufficiently strong to bear the additional weight, and the strain imposed by the pull on the by-pass chains. Weakness is frequently evident in swing brackets.

Accident hazard due to placing lamps too low, or at an awkward angle from the wall, should be avoided.

Supply piping, if exposed, should be placed where it will be as unobtrusive as possible.

Draughts should be avoided as far as possible, to reduce pilot outages. A lamp designed for use outside, may be used inside, but never *vice versa*.

The ordinary installation of illuminating appliances adds so little to the rate of consumption that it is seldom necessary to enlarge either service or meter. In large installations, however, the preinspector should bear in mind this possibility. When the installation involves running a new or an additional system of piping, it should conform to the rules explained in the article in the April, 1918, issue of the Gas Institute *News*. When the installation work involves only the unscrewing of a cap, plug, or pipe joint not larger than ⅜ inch, it is unnecessary to shut off the gas at the meter cock, unless even the small amount of gas which will escape may create a hazard. If larger pipe work is involved, the regular shut off must be made.

Installation.—The general requirements of lamp and fixture installation, as distinguished from adjustment, are as follows:

Before starting, be sure that the gas pressure at the pipe outlet, or fixture nozzle, is sufficient for the requirements of the proposed lamp.

Each lamp should be controlled by a cock either at, or conveniently near, but always in sight of, the lamp.

Use jointing material as follows: Iron to iron, or brass to iron—usual pipe jointing; brass to brass—none, if threads can be made up tight, otherwise—brown soap or grease. For all joints, including slip joints, exposed to great heat or to combustion products, use white lead.

Fit the canopy or box back snugly against the ceiling or wall.

Place the by-pass (pilot) control chains within easy reach of a person of ordinary height.

Adjustment.—The matter of lamp adjustment, which is made by the fitter on every installation, is so important as to warrant its separate consideration.

A lamp may be said to be best adjusted when for the longest time it gives the proper amount of light without attention. The first requisite is the assurance that pipes, cocks, orifices, gauzes and all other gas passages are clear and clean. A lamp with an upright mantle should be adjusted, after installing and burning off the mantle, by turning the gas adjustment to the point where the mantle shows the greatest brilliancy, while

avoiding the cone of flame that will appear at the top of the mantle if too much gas is turned on. A lamp with an inverted mantle, or mantles, cannot properly be adjusted with the mantle in place, since the length and quality of the Bunsen flame, which are the only dependable signs, are not visible through the mantle. The proper regulation of the air and gas adjustments for the inverted mantle will give a flame with a sharp, strong, inner cone of the length found by experiment to be the proper one for lamps of the type in use. Satisfactory lengths vary according to the following table:

	Inches
Lamp with extra long mantles.....	2
Lamp with ordinary size mantles.....	1¼
Lamp with medium small mantles.....	1
Lamp with three small mantles.....	½

After the adjustment has been made in this way, the mantle should be placed on the burner. This adjustment will not necessarily fill the mantle to the greatest possible brilliancy, but it will produce a satisfactory light and will give maximum mantle life and minimum need for further adjustment.

Mantle Installation.—The proper handling and installing of mantles is hardly secondary in importance to the lamp adjustment. Mantles are of two types: that which is burned off during manufacture, and then coated with collodion to prevent damage in shipment; and that which is neither burned off nor coated, but which is shipped as it is woven. This is soft and shapeless and is known as the "rag" type. The collodion coated mantle should be removed from its carrier and installed on the light, in such a manner as to prevent absolutely, even before burning off, any contact with box, fingers, or other object. The slightest touch will damage it, and shorten its service. There are certain helpful "tricks" in removing mantles from their carriers, which should be familiar to every workman. After the burner has been adjusted in the manner previously explained, the collodion coated mantle should be removed from its carrier and held in the natural position of its installation. An inverted mantle should be held in the fingers, by one of the nibs on the mantle ring; an upright mantle by the metal base. No special care is necessary in handling a rag mantle before installation, as its service will not be affected thereby.

An upright mantle should be ignited at the top, and an inverted mantle at the bottom. In the case of a rag mantle the gas should not be turned on during the burning off operation, and the glow in the fabric burning off should be allowed to disappear entirely before the gas is turned on. After installing a rag mantle, it should be allowed to burn for fifteen minutes to harden the fabric where it is tied to the mantle ring. This is a very important requirement. It is not absolutely necessary to follow such a practice with a collodion coated mantle, because it has been hardened during manufacture. However, burning for at least five minutes will prove beneficial.

Bearing in mind these important details of mantle handling and adjustment, it is now proper to describe the sequence of operations to be performed in the installation of an illuminating appliance. In the example following, a single mantle inverted lamp is considered. The principles are the same for every lamp.

(1) Screw burner to by-pass and place pilot rod in position.
(2) Screw this combination to fixture nozzle.
(3) Turn on gas and adjust Bunsen flame to proper quality and length of cone.
(4) Adjust pilot, 5/16 inch long; point away from glassware, and blow out pilot flame.

(5) Put on mantle and burn off.
(6) Turn on gas and let lamp burn.
(7) Put on glassware.

After the installation is complete, the consumer should be instructed in such of the following principles as apply to the lamp in question.

Importance of always pulling by-pass chains all the way down.
Undesirability of burning lamp only partly on or off.
Method of relighting and adjusting pilot.
Method of removing glassware, and importance of keeping it clean.

The preceding descriptions have dealt more particularly with the details of installing lamps in general; those following have to do with specific types of illuminating appliances and accessories.

When installing, all fixtures and lamps should be so handled as to avoid spoiling the lacquer or other finish.

The height of a dome above a dining room table should be such that a line between the eye of a person seated at the table and the lower edge of the dome shade will pass just below the mantle of the lamp. A dome in a place other than a dining room should be hung in accordance with the general rules for height of fixtures.

Fixtures in residences should be hung with the following clearance between the floor and the lowest part of the fixture.

	Over table	Not over table
Hallways	——	7′ 0″
Rooms	5′ 10″	6′ 3″

In stores and factories, fixtures for general illumination should be clear of the floor by at least 6 feet 6 inches, and when inverted lamps are involved, the distance of the light service above the floor should be not less than 7 feet 6 inches. The height of fixtures and lamps provided to light a special operation or machine should be governed by the special conditions.

Indoor arc lamps should be hung at the following heights, provided that this permits sufficient clearance between the top of the lamp stack and the ceiling to comply with the requirements of eliminating fire hazard. Very often ceiling shields or baffle plates must be used above the lamps to prevent this danger.

	Height	
Type	Maximum	Minimum
Upright	9′ 0″	8′ 0″
Inverted—3 burners	9′ 0″	8′ 0″
4 burners	9′ 6″	8′ 6″
5 burners	12′ 0″	9′ 0″

The installation of an outdoor arc involves usually more and better pipe fitting work than that of an installation indoors. The supply is obtained from an inside outlet, and the piping is extended through the outside wall, often through the window frame. Fig. 1 shows an installation of an outdoor arc placed in front of a store with bulk window.

It is to be noted that the outdoor piping is enlarged to prevent freezing, and that the enlargement is made inside the wall. If this is not possible because a hole of the proper size cannot be made in the wall, the enlargement should be immediately outside. The connection should be provided with a drip inside, consisting of a nipple and cap, and also a drip directly above the lamp. The principle of this latter drip is shown in the illustration. It provides an annular space, in which the condensation may collect, surrounding a small stand-pipe through which the gas can pass to the lamp. The drip is emptied through a small plug, also shown in the illustration. The "brass plug" on the elbow at the top of the vertical line above the lamp affords an opening for injecting alcohol to remedy frost trouble. The height of

an outdoor arc lamp should be not less than 8 feet. The support braces are necessary when the lamp is more than 3 feet from the building. After installation the connections should be given two coats of paint.

The method of ignition ordinarily used with an outdoor arc is the pilot flame, the main cock just above the lamp being operated by pull chains. This method is sometimes inconvenient to the consumer, especially in inclement weather; also there exists the chance that the lamp may be operated by unauthorized or mischievous persons. To overcome these difficulties, the connections are installed as shown in Fig. 2.

The main supply cock is located at some convenient point inside the building, and the pilot flame is supplied through a separate line, taken from a branch outlet on the meter side of the

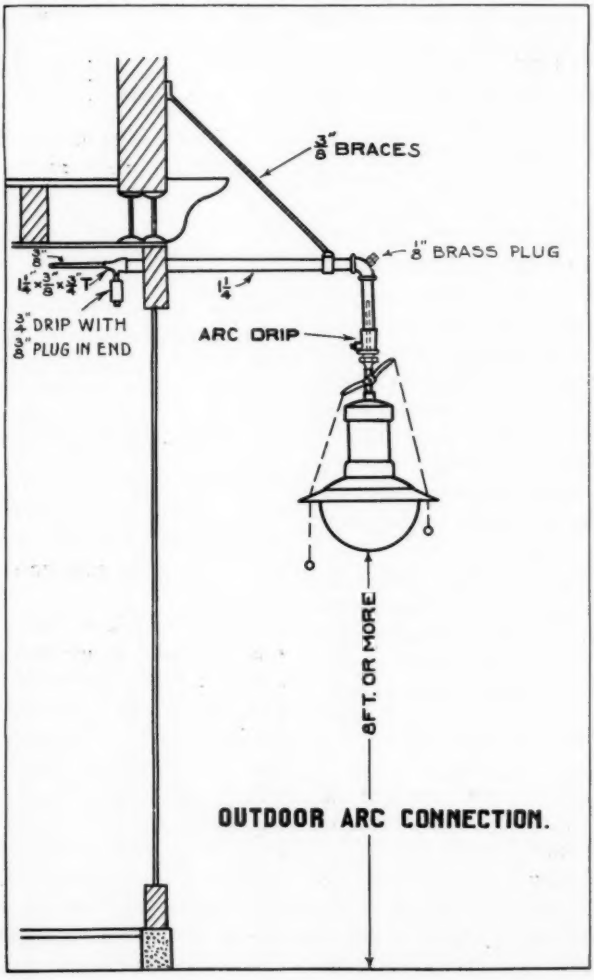


Fig. 1.

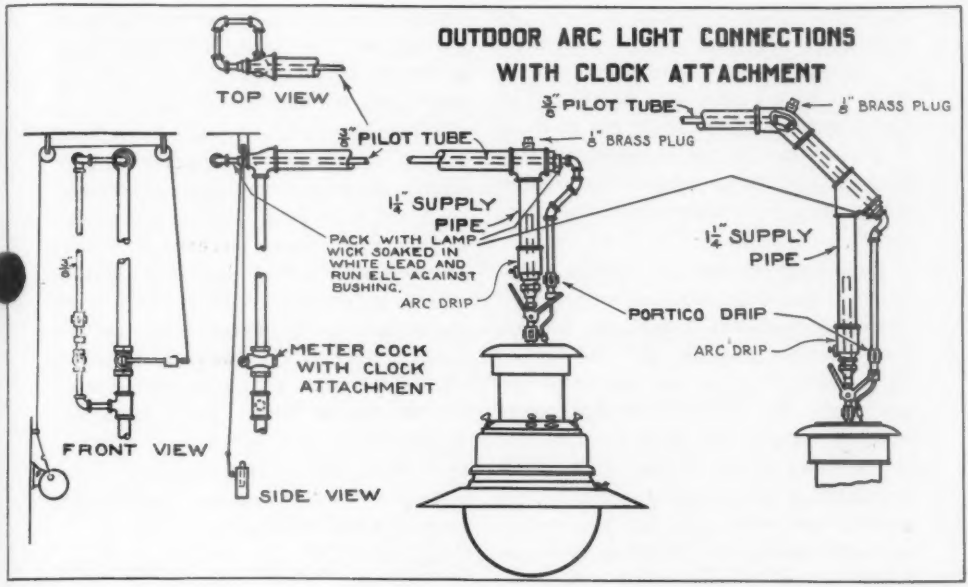


Fig. 2.

main cock. This line is of ⅜-inch pipe, and is installed for some distance within the main 1¼-inch feed pipe. Fig. 2 shows also the method used to enable the automatic extinguishing of the lamp at some predetermined time. The main supply cock is equipped with a lever handle, so weighted that it will close if released. The handle is connected by light sash cord, through pulleys, to the "alarm wind" stem of an ordinary alarm clock, in such a manner that when the alarm starts and the stem revolves, the weight is released and the lamp extinguished.

A sub-inspection one or two days after the installation should be made in a sufficient proportion of the cases to keep each workman up to standard.

Maintenance.—Maintenance visits usually are made either after a request from a consumer for attention, or in accordance with a predetermined schedule. Under the latter scheme the ordinary lamp is kept in good operating condition, but on visits of the former kind, it frequently is found in such a condition that considerable work is required to place it again in proper operation. Because the gas supply is often the cause of trouble, the maintenance man should be familiar not only with the illuminating appliances themselves, but also with the diagnosis and remedy of all troubles with services, meters, and piping.

After a lamp has been properly adjusted, it will continue to give proper service until changes take place which vary the original conditions so greatly as to affect the adjustment or efficiency. Such may be changes in pressure, due to piping, fixtures or cocks becoming obstructed; deposits of dust or other particles within the lamp mechanism or

on the glassware; and unavoidable wear and deterioration of the lamp parts. In general, while a temporary improvement in a condition resulting from one or more of these causes, may be effected by an adjustment of the air or gas mixture, it is the duty of the maintenance man to remove the first cause of the trouble, which may be remote from the lamp itself.

Deposits of carbon on mantles, burners, and glassware are one of the most common causes of complaint, because they greatly diminish the amount of light, and present a very unsightly appearance. The one cause at the bottom of every carbon trouble is the fact that the mixture at the burner tip contains too large a proportion of gas, or too small a proportion of air. This condition may result, first, from an improper adjustment of the gas and air regulators; second, from a gas pressure insufficient to draw the necessary air into the mixing tube; and third, from various conditions of dirt and wear in the lamp mechanism.

The remedy for improper adjustment is easy when it concerns only a regulation of the air and gas, and when this is done, the mantle should be removed, if possible. It is often possible to remove a carbon deposit from a mantle by decreasing the supply of gas, and increasing the supply of air, and then allowing the lamp to burn dimly until the deposit has disappeared. This remedy is never permanent when the trouble is due either to the second or third condition mentioned, and should not be applied unless their absence has been proved.

The second condition—lack of pressure at the pipe or fixture outlet—is the one which affects all lamps alike. If a carbon deposit appears at several points in the building, it is reasonably certain that this is the cause. In such event, an investigation should be made for stopped piping, for a wrongly adjusted house governor, for a meter defective or too small, and for obstructed service.

When the carbon deposit is confined to one lamp only, or to several lamps widely separated, the cause will usually be found to be local. When due to dirt or dust in the lamp mechanism, it may be necessary to take the lamp apart to remove it, or perhaps only to clean out the orifice and gauzes with an air blower. When the cause is worn or burned out parts, they must be renewed. If the trouble arises from attempted adjustment by the consumer, he should be warned against this practice. Some additional local causes of carbonizing mantles are as follows:

Dust or dirt on gauze or in Bunsen tube.
Insufficient secondary air due to lack of, or too small, holes in glassware or shade ring.
Stoppage in gas orifice, or in pilot by-pass cock.
Crooked orifice, allowing gas stream to strike side of mixing tube.

Troubles with pilot flames becoming extinguished are one of the most difficult with which the maintenance man has to contend. When these are of the type that are difficult to diagnose or to explain, no standard rules can be given for their remedy and prevention. If the pilot tip is properly designed and in good condition, the gas way clear, and the adjusting screw and its seat clean, it is probable that trouble is due to variation in pressure, or to the quality of the gas.

In concluding herewith this series of articles on "The Distribution of Gas at Low Pressure," the writer wishes to repeat the statement made in the opening article in the October, 1916, issue of the Gas Institute *News*, that many,

if not all of the principles advocated and the details described, have been taken from a complete series of descriptions of distribution work, prepared by or under the direction of Mr. Walton Forstall. Having had a small part in the preparation of these, the writer has found it impossible to discuss distribution work without constant reference thereto. This source of help is gratefully acknowledged; without it the task of preparing the articles would have been increased many fold.

H. B. ANDERSEN.

(Series concluded)

RECENT ARTICLES IN CHEMICAL PRESS OF INTEREST TO GAS MEN

Contributed by Sub-Committee on Abstracts* of the Chemical Committee

THE ACCURATE DETERMINATION OF CARBON MONOXIDE IN GAS MIXTURES. By J. Ivor Graham, *Journal of the Society of Chemical Industry*, Vol. 38, p. 10T-14T, No. 2, (Jan. 31, 1919). Detailed description of a modified apparatus using the "Iodine Pentoxide" method, covering four pages of illustrations and text in which some results are given showing the accuracy of the apparatus and method. (R. B. Harper.)

A READY METHOD FOR THE EXTRACTION AND ESTIMATION OF DISSOLVED GASES IN WATER. By F. W. Richardson, *Journal of the Society of Chemical Industry*, Vol. 38, p. 32T, No. 3, (Feb. 15, 1919). A one column article describing a new apparatus and method. (R. B. Harper.)

APPARATUS FOR THE CONTINUOUS TESTING OF GASES WITH SPECIAL REFERENCE TO ACID OR ALKALINE CONSTITUENTS. By C. A. King, *Journal of the Society of Chemical Industry*, Vol. 38, p. 33T, No. 3, (Feb. 15, 1919). A one column, illustrated article describing an apparatus to show the alkalinity of gas. Apparatus was originally designed for the detection of ammonia in mond gas which had been treated for the recovery of ammonia. (R. B. Harper.)

GAS PRESSURE GOVERNOR FOR ONE BUNSEN BURNER. By G. R. Clare, *Journal of the Society of Chemical Industry*, Vol. 38, p. 38T, No. 3, (Feb. 15, 1919). Description of an apparatus similar to the type of wet governor used on photometers. (R. B. Harper.)

ESTIMATION OF BENZENE AND TOLUENE IN PETROLEUM. By F. B. Thole, *Journal of the Society of Chemical Industry*, Vol. 38, p. 39T-43T, No. 4, (Feb. 28, 1919). A description of method and test results obtained on synthetic mixtures of known composition. (R. B. Harper.)

ESTIMATION OF CYANOGEN COMPOUNDS IN CONCENTRATED AMMONIA LIQUOR. By Percey E. Spielmann and Henry Wood, *Journal of the Society of Chemical Industry*, Vol. 38, p. 43T-45T, No. 4, (Feb. 28, 1919). Description of method for estimating various forms of cyanogen compounds such as ammonium cyanide and ammonium ferrocyanide. (R. B. Harper.)

THE LIMITS OF SEPARATION BY FRACTIONAL DISTILLATION. A NEW STILL HEAD. By S. F. Dufton, *Journal of the Society of Chemical Industry*, Vol. 38, p. 45T, No. 4, (Feb. 28, 1919). Description with illustration of a new still head for use with small quantities. Results obtained with new still head are given for known synthetic mixture of benzene, toluene and xylol. (R. B. Harper.)

DETERMINATION OF BENZENE, TOLUENE, ETC. IN COAL TAR AND SIMILAR PRODUCTS AND IN THE INTERMEDIATE PRODUCTS OF TAR DISTILLATION. By H. G. Colman, D.Sc. and E. W. Yeoman, B. Sc., *Journal of the Society of Chemical Industry*, Vol. 38, p. 57T-68T, No. 6, (Mar. 31, 1919). A very interesting and extended description of testing

* Abstractors' names appear in brackets following each item.

which covers about 11 pages. (R. B. Harper.)

A Scrubber for Ammonia Distillation. By B. S. Davidson, *Journal Industrial & Engineering Chemistry*, Vol. 2, p. 465, (May 1919). (E. J. Murphy.)

A Simplified Signal Device for Thermometric Readings—Coal Calorimeter. By H. S. Vassar, *Journal Industrial & Engineering Chemistry*, Vol. 2, p. 467, (May, 1919). (E. J. Murphy.)

A Device for Removing Plugs from Stopcocks. By Vernon C. Allison, *Journal Industrial & Engineering Chemistry*, Vol. 2, p. 468, (May, 1919). (E. J. Murphy.)

Fusibility of Ash from Pennsylvania Coals. *Chemical & Metallurgical Engineering Journal*, Vol. 20, p. 629, (June 15, 1919). Gives tables and summary of tests on Pennsylvania coals. (E. J. Murphy.)

How the Nitrogen Problem has been Solved. By Henry J. M. Creighton, *Jour. Frank. Inst.*, 187, 705 (June, 1919). The third and final instalment of an article describing the various nitrogen fixation processes and their most recent development; gives an account of the process of catalytic oxidation of ammonia to form nitric acid, a table of comparative costs and power requirements of the fixation processes, a table showing present annual producing capacities of the various sources of fixed nitrogen in this country and the world, and a bibliography of nitrogen fixation and the oxidation of ammonia. (H. C. Porter.)

Oil Shales. By Dean E. Winchester, *Jour. Frank. Inst.*, 187, 689 (June, 1919). General treatment of the economic possibilities of producing oil and ammonia from shale in this country. No shale oil is as yet produced commercially in the U. S. and little is known of the probable character and composition such an oil would have. "There is little value in having a chemist determine carefully the characteristics of shale oil," since the processes proposed for retorting on a commercial scale all differ materially in the conditions of heating and for this reason will give oils of very different quality. Various proposed processes are described in outline. The industry will eventually succeed in this country but profits per ton of shale will be small. The successful plant will necessarily work on a scale of at least 1,000 tons of shale per day. (H. C. Porter.)

Estimation of Small Quantities of Acetone, Alcohol and Benzene in Air. By Elliot & Dalton, *Analyst*, Vol. XLIV, No. 517, p. 132. The authors give in detail the method used by them in estimating the above named vapors when they are admixed with air in very small quantities (less than 3 parts per million). Acetone is estimated by absorption in alkaline iodine solution, alcohol by oxidation with standard potassium dichromate solution and benzene by a mixture of fuming nitric and strong sulphuric acids. The article is accompanied by a sketch of the absorption apparatus and three tables showing the delicacy of the estimations. (J. Ed. Brewer.)

An Instrument for the Determination of Small Quantities of Carbon Monoxide in Hydrogen. By Rideal & Taylor, *The Analyst*, Vol. XLIV, No. 516, p. 89. The authors describe an apparatus which is capable of recording the amounts of carbon monoxide in continuous hydrogen supplies. A continuous sample of the gas is measured and passed into a chamber where it is subjected to the action of a preferential catalyst capable of converting the carbon monoxide to carbon dioxide without effecting the hydrogen; the carbon dioxide is absorbed in standard lime water and its quantity indicated by the change in electrical conductivity of the absorbing liquid. Several suitable preferential catalysts are mentioned and the article is accompanied by a cut of the apparatus and several typical charts from the carbon monoxide recorder. (J. Ed. Brewer.)

BINDERS FOR A. G. A. MONTHLY

POSTPAID $1.25

New Members Enrolled in the American Gas Association, Inc.

June 1-30, 1919, Inclusive.

GAS COMPANY MEMBERS

Macon Gas Co.....N. M. Hudson, Macon, Ga.
Hyattsville Gas & Electric Co.....R. O. Luqueer, Hyattsville, Md.
Helena Light & Railway Co.....O. W. McConnell, Helena, Mont.
Eastern Oregon Light & Power Co.....J. P. Lottridge, Baker, Ore.
Amarillo Gas Co.....Frank J. Storm, Amarillo, Tex.
Bluefield Gas & Power Co.....J. C. Nichols, Bluefield, W. Va.

MANUFACTURING COMPANY MEMBERS

Bacharach Industrial Instrument Co.....L. J. Speidel, Pittsburgh, Pa.
Burroughs Adding Machine Co.....W. H. Marsh, Detroit, Mich.
Eclipse Stove Co.....A. P. Tappan, Mansfield, Ohio
Elliott-Fisher Co.....George Spahe, Harrisburg, Pa.
Kalamazoo Loose Leaf Binder Co.....Richard Rees, Kalamazoo, Mich.
The Koppers Co.....H. B. Rust, Pittsburgh, Pa.
Maxon-Premix Burner Co.....H. R. Maxon, Muncie, Ind.
Republic Flow Meters Co.....J. M. Spitzglass, Chicago, Ill.
Western Gas Construction Co.....Thos. W. Stone, Fort Wayne, Ind.

Active Members

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Public Service Co. of Nor. Ill., Chicago
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John F. Gilchrist
Illinois Traction System, Peoria
R. B. Richardson
Eclipse Gas Stove Co., Rockford
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Consumers' Light, Heat & Power Co., Topeka
L. G. Treleaven

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Welsbach Co., Boston
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Public Service Gas Co., Jersey City
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Public Service Gas Co., Newark
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Public Service Gas Co., Trenton
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Connersville Blower Co., New York
Horace Krake
Central Hudson Gas & Elec. Co., Poughkeepsie
Arthur R. Wellwood

OHIO

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M. F. McDermott

PENNSYLVANIA

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C. C. Thomas
The United Gas Imp. Co., Philadelphia
Lawrence C. Heiss

WISCONSIN

C. F. Burgess Laboratories, Madison
C. F. Burgess

BELGIUM

Humphreys & Glasgow, Ltd., Brussels
T. A. Vander Willigen

ENGLAND

City of Birmingham Gas Dept., Birmingham
A. W. Smith
Brentford Gas Co., Brentford
Alexander A. Johnston
Grays & Tilbury Gas Co., Grays
Arthur W. Sumner
Nuneaton Gas Co., Nuneaton
George Helps

THE NETHERLANDS

Municipal Gas Works, Rotterdam
Melchior C. Sissingh

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Advertising Section		Gas Age, June 16, 660
Affiliations		A. G. A. Monthly, May, 249 Gas Industry, June, 167
Annual Exhibition		A. G. A. Monthly, May, 253; 257
Col. Oscar H. Fogg Elected Secretary-Manager		A. G. A. Monthly, May, 247 Gas Industry, June, 157
Educational Diplomas		A. G. A. Monthly, May, 280
Headquarters for Convention		A. G. A. Monthly, June, 316
Heating Committee		A. G. A. Monthly, May, 261
Industrial Fuel Service		A. G. A. Monthly, May, 260 Gas Age, June 16, 682
Nominating Committee Report		A. G. A. Monthly, June, 322
Technical Section Committees		A. G. A. Monthly, May, 265; June, 330
B. C. G. A. Work and Policy	F. W. Goodenough	Gas Jour., May 6, 304
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Presidential Address	S. Glover	Gas Jour., June 3, 559, 563 Gas World, May 31, 415, 423, 475
Iowa District Gas Assn.		Gas Record, May 28, 333 Am. G. E. Jour., June 14, 519 Gas Age, June 16, 655
National Fire Protection Assn. Ottawa, Ont., May 6-7-8	C. E. Worthington	Safety Engrg., May, 221
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New Jersey Gas Assn. Trenton, Apr. 25		
Society of Chemical Industry London Section, May 15		Gas Jour., May 13, 364
Southern Gas Assn. Ashville, N. C., May 20-22		Am. G. E. Jour., May 24, 451; May 31, 478 Gas Record, May 28, 340 Gas Age, June 2, 598 Gas Industry, June, 173
Southwestern Gas Assn. Galveston, Tex., May 12-14		Gas Record, May 28, 336 Gas Age, June 2, 600
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BY-PRODUCTS.

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Benzol Extraction, Oil for		
Benzol Motor Fuel	J. A. Norcross	Am. G. E. Jour., May 24, 443; June 7, 501 Gas Age, June 16, 656 Gas Jour., June 17, 751
By-Product Extraction-France		Gas Jour., May 20, 437
By-Products in the War—Gas and Coke	H. C. Porter	A. G. A. Monthly, May, 266 Gas Jour., June 17, 754

ARTICLE	AUTHOR	PUBLICATION
By-Product Oven Gas		Gas Age, June 16, 653
Carbon Disulphide, Measuring	Dr. P. E. Spielmann T. B. Jones	Gas Jour., May 13, 364
Coal Tar Industry Considered by Congress	O. F. S.	Gas Age, June 16, 665
Coke Markets—French		Gas Age, June 2, 593
Coke Oven Distribution in Tonawanda		A. G. A. Monthly, June, 338
Coke, Selling Genuine Gas	V. A. Miller	Gas & El. News, Apr., 224
Coke, Domestic, Iowa D. G. A. Paper	C. J. Hauschildt	Gas Record, May 28, 344
Coke, Greenhouse and Garage		B. C. G. A. Bul., May, 86
Coke Water Heaters		B. C. G. A. Bul., May, 86
Dye Industries and Gas (Inst. Gas Engr. Paper)		Gas World, May 31, 454 Gas Jour., June 3, 596
Dye Industry—History of		Gas World, May 31, 455
Dyestuffs, President Asks Protection for		Gas Age, June 2, 610 Gas Jour., May 13, 369
Gasoline From Natural Gas, Testing Content of		Gas Age, June 2, 596
Nitrogen Fixation Process	A. H. White	Gas Jour., May 13, 369
Nitrogen, Problem Solved	H. J. M. Creighton	Jour. Franklin Inst., June, 705
Nitrogen, World's Supply	G. W. Anderson	Gas Jour., June 10, 695
Sulphuric Acid Plants		Gas World, June 7, C. S. 12
Tar and Pitch, Estimation of	Dr. P. E. Spielmann	Gas World, May 10, 358
Tar and Pitch, Free Carbon in	Dr. P. E. Spielmann H. Wood	Gas Jour., May 13, 364
Tar as Diesel Engine Fuel		Gas World, May 17, 372
Tar Distillation—Continuous (Sulzer Process)	P. Gassett	Gas Industry, June, 168
Tarred Roads	F. E. D. Acland	Gas World, May 31, 477 Gas Age, June 2, 593; June 16, 653 Gas Jour., June 3, 644
Thiophene, Estimation of	Dr. P. E. Spielmann Dr. S. P. Schotz	Gas Jour., May 13, 364

DISTRIBUTION AND TRANSMISSION.

Automobile vs. Motorcycle in Transportation System	D. P. Allen	Am. G. E. Jour., June 14, 507
Drip Pumping by Motor Wagon	W. Forstall	A. G. A. Monthly, May, 278 Gas Industry, June, 168
Electric Truck in Modern Transportation	E. E. LaSchum	N. E. L. A. Bul., May, 278
Emergency Motor Cars, Boston Company Installs Fifteen		Am. G. E. Jour., June 14, 518
Flow Capacities, Natural Gas	E. O. Hickstein	Am. G. E. Jour., June 7, 483
Flow, Computation of Gas	A. C. Howard	A. G. A. Monthly, June, 333
Governors, Station or District	MacD. Dexter	Am. G. E. Jour., May 31, 464 Gas Age, June 2, 612
Holders, Spiral-Guided		Gas Jour., May 20, 432
Main Extension Problems	W. A. Bertke	Gas Record, May 28, 341
Meter Reading, Teaching Public School Children	E. D. Brewer	Gas Record, June 11, 378
Meter Repairing	T. Glover	Gas Jour., May 13, 378
Meter Spraying Outfit		Gas Age, June 2, 615
Meters—Life of		Gas World, May 31, 451 Gas Jour., June 3, 592, 622
Meters Ten Years in Service Need Opening for Repairs Guild of Gas Mgrs. Paper	H. A. Norton	Gas Record, June 11, 375 Am. G. E. Jour., June 14, 505 Gas Age, June 16, 635
Motor Vehicle, Care of	J. E. Bullard	Gas Age, June 16, 673
Paint for Rusty Pipe	T. J. Tonkin	Am. G. E. Jour., June 14, 506
Pipe, Iron and Steel		Architects' Jour., June, 283
Prepay Meters — Restoration Ordered by P. S. C., Boise, Id.		Am. G. E. Jour., June 14, 520

ARTICLE	AUTHOR	PUBLICATION
Pressures, Uniform Gas Supply		Gas Jour., May 20, 434
	S. C. Singer	Gas Record, May 28, 343
Rubber Hose to Connect Meters for Testing	T. H. Kerr	Am. G. E. Jour., May 24, 443
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Submarine Gas Main, Laying	G. Kirk	Pub. Serv. Mag., May, 388
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FINANCIAL AND ACCOUNTING.		
Business Situation, The	W. B. Colver	Gas Age, June 16, 645, 652
Deposits, Handling Consumers'		Tex. Utility News, May 3
Natural Gas Financing to Come This Summer	E. C. Jennings	Gas Age, June 16, 666
New Price Level a Stubborn Reality	I. Fisher	Gas Record, June 11, 374
Poughkeepsie Sells Bond Issue		Gas Age, June 2, 573
Profit Sharing	E. D. Carpenter	Am. G. E. Jour., May 31, 470
Rate Making	C. F. Elmes	Am. G. E. Jour., May 24, 439
Rates Offset Dwindling Dollar	F. C. Hamilton	Gas Record, May 28, 353
		Gas Age, June 16, 648
Rates Higher to Save Natural Gas	M. Saul	Gas Record, May 28, 323, 351, 354
	C. W. Sears	
	T. B. Gregory	Am. G. E. Jour., June 14, 520
Selling Preferred Stock to Local Investors	W. H. Hodge	Gas Age, June 2, 579
Unprofitable Consumers Nat. Gas Assn. Paper	H. J. Hoover	Gas Age, June 2, 585
Utiltiy Securities		Gas Age, June 16, 675
GENERAL.		
Accidents, The Why and How	G. O. Smith	Doherty News, June, 19
Acetylene Welding—British	N. MacLeod	Jour. Acet. Wldg., June, 601
Belt Driving, Handy Rules		Gas World, May 17, 378
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Daylight Saving, Support for		Greater N. Y., June 9, 11
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Engines—Higher Efficiency in Prime Movers	F. E. D. Acland	Jour. R. Soc. of Arts, June 6, 463
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Health Risks From Dust	J. Roach	Safety Engrg., May, 236
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Respirators, Masks and Breathing Apparatus		Gas Age, June 16, 655
Resuscitation From Electrical Shocks, Rules for		N. E. L. A. Bul., May, 248
Welfare Work for Employees		Labor Bureau Bul. No. 250, 7
Women's Work Garments		Safety, May, 89
LEGISLATION AND COMMISSION CONTROL.		
B. t. u. Standard—Indiana Fixes 570		Am. G. E. Jour., June 14, 522
Chicago Gas Company Testimony	J. M. Morehead	Am. G. E. Jour., May 31, 476

ARTICLE	AUTHOR	PUBLICATION
Extensions and Additions Under Municipal Control		Am. G. E. Jour., May 31, 462
Increased Rates—No Increased Profits (Brockton, Mass.)		Am. G. E. Jour., June 14, 521
Meter, Right to Remove		Gas Age, June 16, 638
Natural Gas Distribution—Virginia Case		Gas Age, June 16, 667
Public Policies for Public Utilities	J. A. Britton	Pub. Ser. Mag., May, 376
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Public Utility Considerations		A. G. A. Monthly, June, 335
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Theft of Gas—Missouri Law American and English Digest		Am. G. E. Jour., June 7, 484 Gas Age, June 16, 636
Utilities Need a Square Deal	G. B. Cortelyou	Am. G. E. Jour., May 31, 463 Gas Age, June 16, 641 A. G. A. Monthly, June, 307
Wartime Gas Rates, Mass. Commission Favors		Am. G. E. Jour., June 14, 521

MANAGEMENT AND OWNERSHIP.

Architects—Co-operation	R. S. Doull	A. G. A. Monthly, June, 323
Company Section Movement	H. L. Doherty	N. E. L. A. Bul., May, 288
Complaints, Adjusting	J. E. Bullard	Gas Age, June 2, 620
Co-operation — Employer and Employee	J. B. Douglas	Gas Age, June 2, 575 Gas Jour., June 10, 698
Education of Gas Engineer Inst. Gas Engrs. Paper	Prof. A. Smithells	Gas World, May 31, 444 Gas Jour., June 3, 567. 582
Employees Affect Good Will	R. S. Torrance	Gas Record, June 11, 383
Federal Control and Statistics, Natural Gas	T. B. Gregory	Gas Age, June 16, 646
Gas Industry, Commercial Position of	J. Abady	Gas World, May 24, 410
Management, Presidential Addresses Consider		Gas Industry, June, 159, 163, 164
Natural Gas Conservation	C. W. Seares Editorial F. H. Mugg	Gas Age, June 2, 588, 602 Gas Age, June 2, 591 Am. G. E. Jour., May 31, 457
Ownership, Customer	W. H. Hodge B. F. Wellington	Byllesby Co. Bul., May 23, 2 Byllesby Co. Bul., June 7, 2
Ownership, Municipal	Dr. W. Clark	Gas Jour., May 20, 439 Gas Age, June 16, 639
Ownership, Abandoned Municipal Plants	G. Marston	N. E. L. A. Bul., May, 246
Ownership, Public, Failure of	F. G. R. Gordon	Civic Fed. Review, May 15, 18 Greater N. Y., May 26, 6 S. P. U. Mag., June 1, 7, 10

MANUFACTURE OF GAS.

Bench Building Economies	L. G. Crenshaw	Am. G. E. Jour., June 7, 491
Bituminous Water Gas		Gas Age, June 16, 652
Boilers, Banking of		Tex. Utility News, May, 37
B. t. u., and Price, Coke Oven Gas		Gas World, May 17, 374
B. t. u., 400-500 Gas Proposed for Great Britain		Gas Age, June 2, 569
B. t. u.'s, Unequal in Value	Dr. W. B. Davidson Maj. H. L. Strange	Gas Jour., June 3, 577, 578
Calorific Value of Gas		Gas Jour., May 13, 353, 356, 359, 362, 373
Carbonization, Iron Retort		Gas Age, June 2, 586

ARTICLE	AUTHOR	PUBLICATION
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Chemist and Engineer	Dr. F. M. Perkin	Gas Jour., May 27, 495
Clinkers, Removing from Water Gas Generators	G. I. Vincent	Gas Jour., May 6, 291
Cost vs. Production		Gas Jour., May 6, 284, 293
Economies in War Gas Manufacture		Gas Jour., May 6, 285, 296
Gas Investigation		Gas World, May 31, 429 Gas Jour., June 3, 564, 575, 607
Gas Plant, Maintenance and Care	F. R. Parsons	Gas World, May 10, 364
Gas Undertakings During War	H. Townsend	Gas World, May 31, 463 Gas Jour., June 3, 624
Heat Conductivity	G. Edwards A. Rigby J. W. Mellor	Gas World, May 31, 448 Gas Jour., June 3, 619
Heat Economies at Rochester	W. H. Earle	A. G. A. Monthly, May, 275
Individual Gas Plants Holland		Am. G. E. Jour., June 7, 496
Inerts—Effect in Gas	Dr. Lessing	Gas Jour., May 27, 489 Gas World, June 7, 491
Lignite, Production of Gas		Gas Jour., May 20, 439
Manufactured Gas Displacing Natural Gas	J. H. Maxon	Gas Age, June 2, 583 Gas Record, May 28, 349
Manufactured Gas to Supplement Natural Gas	K. C. Krick	Gas Age, June 2, 567
Metering Oven Gas	F. M. Nourse	Gas Record, June 11, 379
Odors From Gas Works		Gas Age, June 2, 574
Price of Gas vs. Price of Coal		Gas Jour., June 10, 696
Purification and Purifier Design	F. W. Steere	Gas Jour., May 6, 303
Purification of Gas, Liquid		Gas Jour., May 27, 495
Purifier Construction, Concrete	A. E. Broadberry	Gas World, May 31, 459 Gas Jour., June 3, 601
Retorts, Regenerative-Fired	O. Peischer	Gas Jour., May 13, 360
Steaming Retorts	D. Currie	Gas World, May 10, 366; May 24, 406; May 31, 478 Gas Jour., June 3, 636
	H. J. Toogood	Gas Record, June 11, 377
Water Gas Machine Factors	R. B. Harper	Gas Jour., May 6, 288
Water Gas Manufacture		Gas World., May 17, 381
Wood Gas in Stockholm		Gas Jour., May 6, 301
Wood Gas in Germany		Gas Jour., May 20, 427 Gas World, May 17, 375

MATERIALS—RAW.

Brown Coals, New Zealand		Gas Jour., May 27, 498
Coal Conservation	A. B. Roxburgh	Gas World, May 17, 373; May 31, 422
Coal—Full Use of All Elements		Gas Age, June 16, 643
Coal Substitutes (Montevideo)	C. Hunt	Gas World, May 31, 478, 484 Gas Jour., June 3, 635, 639
Coal Utilization, Economies of	S. Wellington	Gas World, May 24, 405
Ferrocyanide		Gas Age, June 16, 675 Gas World, May 31, 451
Magnesite as a Refractory		Gas World, June 7, C. S. 16

NEW BUSINESS—SALES DEPARTMENT.

Advertising—Handshake Copy	R. Dickson	Printers' Ink, May 22, 17
Advertising That Helps Sales	C. W. Pierson	Gas Age, June 16, 676
Advertising Through Children		Am. G. E. Jour., May 31, 471
Appliance Sales—1918 Report Rochester		Gas & Elec. News, Apr., 226
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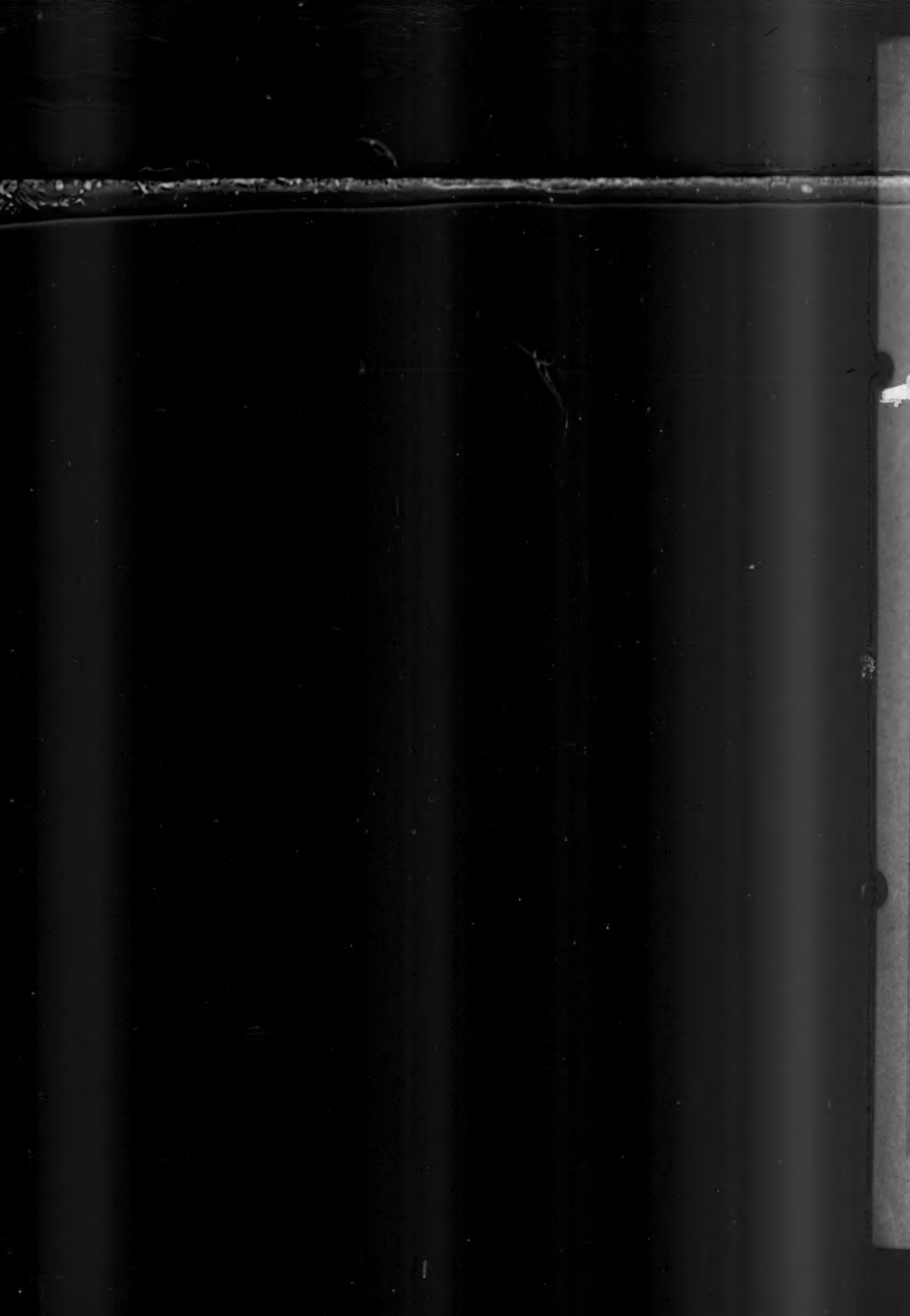
Gas Water Heating Week (June 9-14)		A. G. A. Monthly, May, 250 Gas Industry, June, 157 Gas Age, June 2, 624 Gas Record, June 11, 366
Industrial Engineer at Rome		A. G. A. Monthly, June, 318
Lower Selling Costs and New Business	G. A. Nichols	Printers' Ink, June 5, 3
Power in the Home, Need of Small Gas Motor	W. A. Tookey	Gas World, May 17, 376
Prizes, Manufacturers Offer		A. G. A. Monthly, June, 326
Publicity, A Plea for More Southern Gas Assn. Paper	M. Saul	Gas Record, June 11, 371
Sale of Gas, Development of	F. M. Holland	Gas Jour., May 6, 307
Sales Development Committee		A. G. A. Monthly, June, 320
Sales, Los Angeles Range	B. B. Baker	Gas Age, June 2, 627
Selling for Publicity Value	L. Resnick	Am. G. E. Jour., June 7, 485, 490
Service and Teaching Economy	H. E. Danner	Gas Record, May 28, 346
Systematic Canvass Results Wis. G. A. Paper	R. O. Jasperson	Gas Age, June 16, 670
Window Display		Edison Sales Builder, June, 15 A. G. A. Monthly, June, 315
UTILIZATION OF GAS.		
Brass Melting, Gas Fuel	A. A. Treadway	Gas Record, May 28, 337
Church Lighting	J. E. Bullard	Pub. Ser. Lumen, June, 4 Am. G. E. Jour., June 7, 481
Gas Engines		
Large Types		Gas World, May 17, 379
Design, etc. and Steam, Efficiency	H. B. Andersen	A. G. A. Monthly, May, 285 Gas World, May 17, 377 Gas Jour., June 10, 691
Gas for Domestic Purposes B. C. G. A. Wales Meeting	R. G. Clarey	Gas Jour., May 13, 375
Gas in Industries—Toronto	G. W. Allen	Gas Age, June 2, 618
Gas-Steam Engine, (Still)		Gas World, May 31, 477 June 21, 531 Gas Jour., June 3, 636
Heating and Ventilation		Gas World, May 24, 402
Heating Appliances	H. B. Andersen	A. G. A. Monthly, May, 284
Heat, Light and Motive Power	Sir D. Clerk	Gas Age, June 2, 592
Home and Factory, Increasing Utility of Gas	A. B. Roxburgh	Gas Jour., May 6, 314 Gas World, May 10, 359
Hotel Gas Equipment Pennsylvania, New York Seneca, Rochester, N. Y.		A. G. A. Monthly, May, 257 Gas & Elec. News, Apr., 215
Hot Water, Domestic		1001 Uses for Gas, No. 64
House Heating by Gas	W. W. Cummings	Gas Age, June 2, 623
B. C. G. A. Meeting, Derby	F. W. Goodenough	Gas Jour., May 13, 373 Gas Industry, June, 169
Housing Schemes, Gas in	W. J. Sandeman	Gas Jour., May 6, 310; June 10, 697
Illuminations, Outdoor		B. C. G. A. Bul., May, 82
Industrial Gas Opportunity	R. Falconer	Gas Age, June 16, 680
Industrial Installations Indiana Gas Assn. Paper	J. W. Smith	Gas Record, June 11, 380
Industrial Possibilities		Gas Age, June 16, 678
Lighting in Wartime	P. S. Millar	I. E. S. Proc., Apr. 30, 146
Lighting of Buildings	Dr. W. P. Gerhard	Architects' Jour., May, 227
Lightship Bell, Gas Operated		Am. G. E. Jour., May 31, 477
Photo-Engraving Plate Oven	G. C. Shadwell	Am. G. E. Jour., June 14, 501
Varnish Manufacture, Gas in	G. C. Shadwell	Gas Record, June 11, 363
Ventilation of Appliances		Int. Gas Jour. of Can., June, 211

First Annual Convention and Exhibition of the A. G. A.
HOTEL PENNSYLVANIA, OCTOBER 13-18



Two Timely Questions

I. Are the manufacturers of gas appliances and equipment contributing to the general prosperity of the industry from which they derive support, by participating actively, as members, in the American Gas Association?

II. Are the gas companies showing their appreciation of the cooperative spirit of manufacturers of gas appliances and equipment, by dealing with those who have indicated their progressive and helpful attitude toward the gas industry by becoming members of the American Gas Association?

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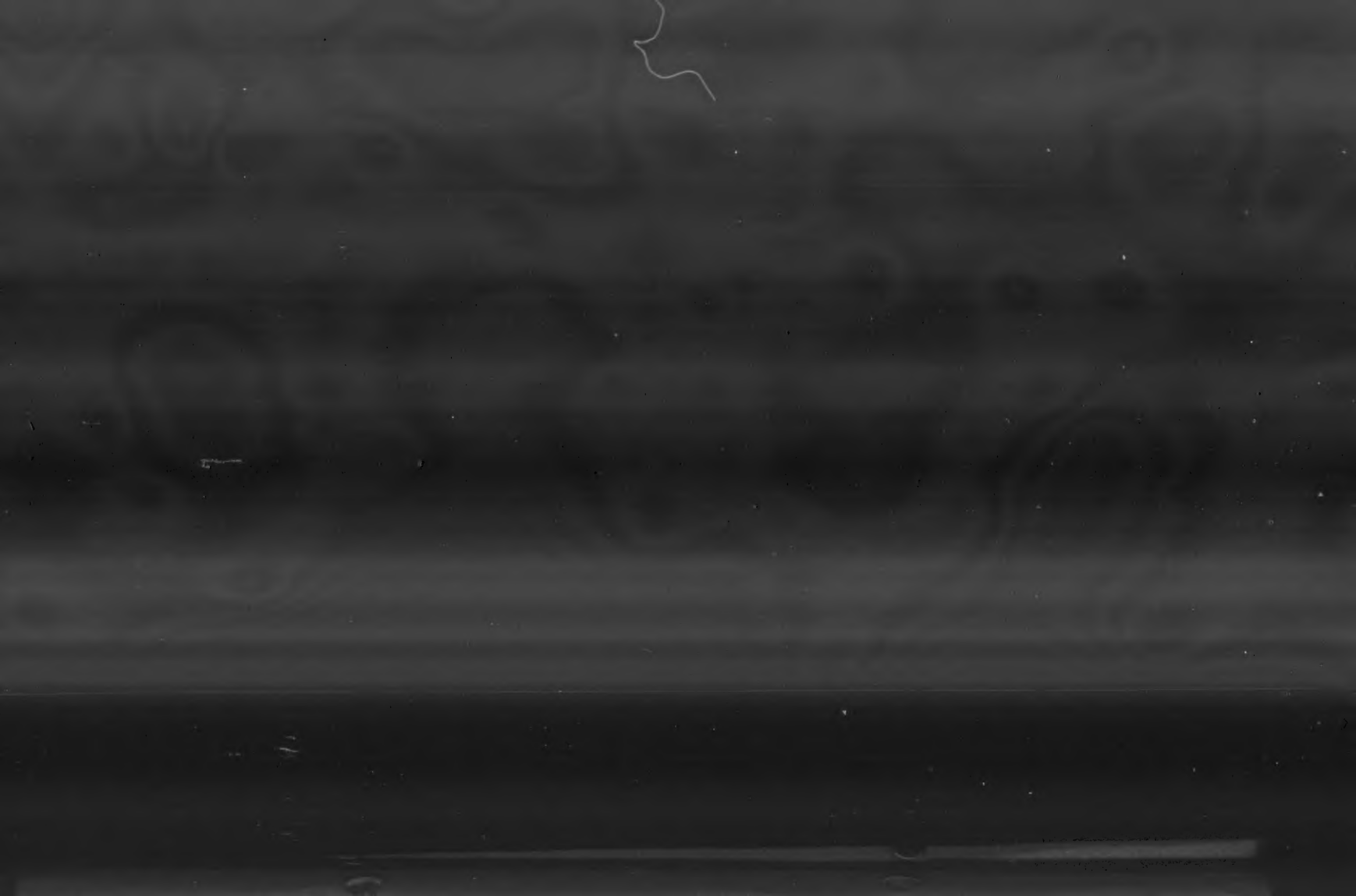
ARTHUR HEWITT	Toronto, Can.
SAMUEL INSULL	Chicago, Ill.
SIDNEY MASON	Gloucester, N. J.
THOMAS N. McCARTER	Newark, N. J.
EMERSON McMILLIN	New York, N. Y.
JAMES L. RICHARDS	Boston, Mass.
HARRY D. SCHALL	Detroit, Mich.

Section Officers.

ACCCOUNTING—Chairman	HALFORD ERICKSON	Chicago, Ill.
Vice-Chairman	A. P. POST	Philadelphia, Pa.
COMMERCIAL—Chairman	EDGAR N. WRIGHTINGTON	Boston, Mass.
Vice-Chairman	CHARLES A. MUNROE	Chicago, Ill.
Secretary	LOUIS STOTZ	Ass'n Headquarters
MANUFACTURERS—Chairman	A. P. BRILL	Pittsburgh, Pa.
Vice-Chairman	MARON P. ROPER	Rockford, Ill.
Secretary	W. W. BARNES	Ass'n Headquarters
TECHNICAL—Chairman	JOHN B. KLUMPF	Philadelphia, Pa.
Vice-Chairman	CARL H. GRAF	Albany, N. Y.
Secretary	H. W. HARTMAN	Ass'n Headquarters

SECRETARY-MANAGER	OSCAR H. FOGG	Ass'n H'dquarters.
ASS'T SECRETARY-MANAGER	LOUIS STOTZ	Ass'n H'dquarters.
ASS'T TREASURER	W. CULLEN MORRIS	New York, N. Y.